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(71)Applicant : NEC CORP

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(72)Inventor : ENDO HIRONARI

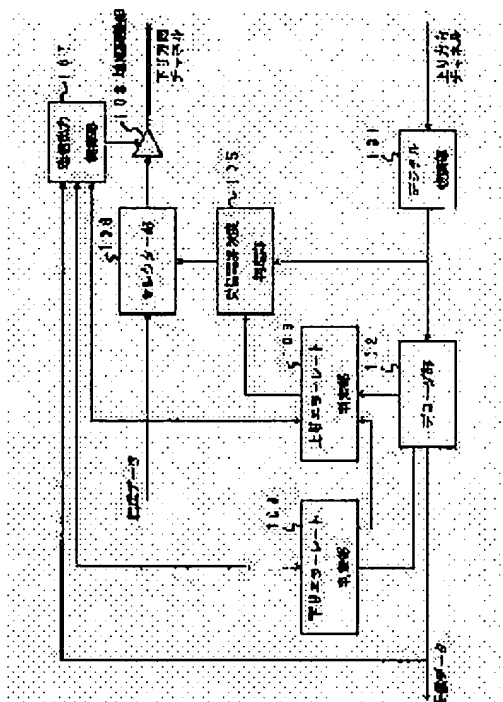
YAHAGI MASAHIKO

## (54) SENDING POWER CONTROLLER FOR MOBILE COMMUNICATION SYSTEM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To control the sending output of one of incoming and outgoing channels according to the speech quality of the relevant channel and to suppress the unnecessary output radio waves to reduce the interference to the other communication as much as possible in a mobile communication mode of a CDMA(code division multiple access) system.

**SOLUTION:** An incoming error rate decision part 103 decides the speech quality of an incoming channel, and an outgoing error rate decision part 104 decides the speech quality of an outgoing channel. If it's decided that the speech quality is deteriorated and may not possibly be improved in each channel, each of parts 103 and 104 has an instruction to reduce the sending output of the other channel down to a level lower than the normal value to control the output. If it's decided that the speech quality of its own channel is deteriorated and may not possibly be improved, the sending output of its own channel is reduced down to a level lower than the normal value.



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## CLAIMS

## [Claim(s)]

[Claim 1] The mobile radio terminal which is sent out from a base transceiver station and which got down, received the electric wave of a direction and was equipped with means concerned to get down, to measure the rate of a framing error of an electric wave, and to notify the aforementioned base transceiver station A means to receive the electric wave of the going-up direction sent out from the mobile radio terminal concerned, and to detect the received-data error of the going-up electric wave concerned, and a means to measure received field strength The rate of a framing error of the electric wave of the direction of going down notified from the aforementioned mobile radio terminal which is the transmitted power control unit of the mobile communications system equipped with the above, and was extracted from the electric wave of the uphill direction is acquired. The going-down error rate judging section which will get down if the thing [ that get down and the rate of a framing error of the electric wave of a direction is not improved ] concerned is judged, and outputs electric wave quality degradation information, Compute the rate of a framing error of the electric wave of the uphill direction, and the target received field strength value based on the rate of a framing error of the electric wave of the computed going-up direction is outputted. The uphill error rate judging section which usually sets up and outputs the aforementioned target received field strength value to a low value from a value when [ at which the aforementioned going-down error rate judging section outputs ] it gets down and electric wave quality degradation information is received, The received field strength value of the electric wave of the going-up direction which carried out reception measurement with the target received field strength value which the aforementioned uphill error rate judging section outputs is compared. The received field strength value of the electric wave of the going-up direction which carried out reception measurement a low case from a target received field strength value the increase in a transmitting output Moreover, the received field strength judging section which outputs the information which directs reduction of a transmitting output to the aforementioned mobile radio terminal, respectively when the received field strength value of the electric wave of the going-up direction which carried out reception measurement is higher than a target received field strength value, It is characterized by having the transmitting output-control section which is notified from the aforementioned mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, gets down based on the rate of a framing error of the electric wave of a direction, and controls the transmitting output of the electric wave of a direction.

[Claim 2] The aforementioned uphill error rate judging section computes the rate of a framing error of the electric wave of the uphill direction. It has further an uphill electric wave quality degradation judging means to go up when [ which set up beforehand the rate of a framing error which the rate of a framing error of the electric wave of the computed going-up direction set up beforehand ] it exceeds during the period, and to output electric wave quality degradation information. When the aforementioned uphill electric wave quality degradation information which the aforementioned uphill error rate judging section outputs is received, the aforementioned transmitting output-control section The transmitting output of the electric wave of the direction of going down which is notified from the

aforementioned mobile radio terminal extracted from the electric wave of the uphill direction and which it gets down and is set up based on the rate of a framing error of the electric wave of a direction is set more as a low value. The transmitted power control unit of the mobile communications system according to claim 1 characterized by having the 1st output-control means to output further.

[Claim 3] When the aforementioned transmitting output-control section receives the aforementioned going-down electric wave quality degradation information which the aforementioned going-down error rate judging section outputs, The transmitting output of the electric wave of the direction of going down which is notified from the aforementioned mobile radio terminal extracted from the electric wave of the uphill direction and which it gets down and is set up based on the rate of a framing error of the electric wave of a direction is set more as a low value. The transmitted power control unit of the mobile communications system according to claim 1 or 2 characterized by having the 2nd output-control means to output further.

[Claim 4] The aforementioned uphill error rate judging section is the transmitted power control unit of the mobile communications system according to claim 3 characterized by having further a means to usually set up and output the target received field strength value set up based on the rate of a framing error of the electric wave of the uphill direction to a low value from a value when the aforementioned uphill electric wave quality degradation information is outputted.

[Claim 5] The aforementioned transmitted power control unit is further equipped with the traverse-speed test section which measures the traverse speed of a mobile radio terminal from a time change of an electric wave which receives from the aforementioned mobile radio terminal, and outputs speed information. Based on the speed information which the traverse-speed test section concerned outputs, the aforementioned going-down error rate judging section changes the conditions which output the aforementioned going-down electric wave quality degradation information. The aforementioned uphill error rate judging section is the transmitted power control unit of the mobile communications system according to claim 2 or 4 characterized by changing the conditions which output the aforementioned uphill electric wave quality degradation information.

[Claim 6] The aforementioned transmitted power control unit is further equipped with the subscriber class judging section which discriminates the subscriber class of a mobile radio terminal from the terminal identification information included in the electric wave received from the aforementioned mobile radio terminal. Based on the subscriber class which the subscriber class judging section concerned outputs, the aforementioned going-down error rate judging section changes the conditions which output the aforementioned going-down electric wave quality degradation information. The aforementioned uphill error rate judging section is the transmitted power control unit of the mobile communications system according to claim 5 characterized by changing the conditions which output the aforementioned uphill electric wave quality degradation information.

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## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] Especially this invention relates to the transmitted power control unit which performs the transmitting output control which got down with the uphill direction channel and took into consideration each radio quality of a direction channel in the mobile communications system which used the CDMA (Code Division Multiple Access: sign diffusion multiplexing) method for communication with a base transceiver station and a mobile radio terminal about the transmitted power control unit of a mobile communications system.

[0002]

[Description of the Prior Art] Drawing 11 reference AN OVERVIEW OF THE APPLICATION OF CODE DIVISION MULTIPLE ACCESS(CDMA) TO DIGITAL CELLULAR SYSTEMS AND PERSONAL CELLULAR NETWORKS (Ann exaggerated view ) OBU THE Application OBU code Division Multiple Access (SHIDEEMUE) toe Digital one Cellular Systems and -- personal -- cellular it can set to the conventional mobile communications system currently indicated by networks -- It is the block diagram showing the equipment configuration concerning the transmitting output control in a base transceiver station. Drawing 12 is a flow chart which shows the control action of the uphill direction channel of the transmitting output control in the equipment configuration shown in drawing 11 . The transmitting output control of drawing 11 gets down, and drawing 13 is the flow chart of the control action of a direction channel.

[0003] A base transceiver station gets down with the transmitting output control of the electric wave of the uphill direction channel of a mobile radio terminal, and the conventional transmitting output control is performing independently the transmitting output control of the electric wave of a direction channel. The transmitting output control of the electric wave of the uphill direction channel is performed as follows.

[0004] In a base transceiver station, the received field strength of the electric wave of the received uphill direction channel is measured in the digital recovery section 1101 (Step 1201), and it is notified to the received field strength judging section 1104. Moreover, in the decoder section 1102, error detection of received data is performed (Step 1202), the result is gone up, and it notifies to the error rate judging section 1103.

[0005] In the uphill error rate judging section, fixed period (for example, 2 seconds) accumulation of the result of the error detection which received the notice is carried out, and the rate of a framing error is computed based on them (Steps 1203-1205). Moreover, in the uphill error rate judging section 1103, the rate of a target framing error is set up beforehand, and target received field strength is computed. And in the uphill framing error judging section 1103, from the computed rate of a framing error, correction is added to target received field strength, target received field strength is set up anew (Step 1206), and it is notified to the received field strength judging section 1104.

[0006] The target received field strength beforehand notified from the uphill error rate judging section 1103 in the received field strength judging section 1104 when an electric wave is received from a mobile

radio terminal, Received field strength measured at the time of the reception of the electric wave of the uphill direction channel which received the notice from the digital recovery section 1101 is measured (Step 1207). Consequently, when received field strength is larger than target received field strength, to a mobile radio terminal, it gets down and transmitting output reduction directions are performed by the electric wave of a direction channel (Step 1209). When received field strength is smaller than target received field strength, the increase directions in a transmitting output are performed to a mobile radio terminal (Step 1208).

[0007] Moreover, it gets down and the transmitting output control of the electric wave of a direction is performed as follows.

[0008] Also in a mobile radio terminal, the rate of a framing error of the electric wave of the received direction channel of going down is measured.

[0009] And the result is put on the electric wave of the uphill direction channel at a fixed interval (for example, 2 seconds), and a base transceiver station is notified of it at it. In a base transceiver station, the rate of a framing error of the electric wave of the direction channel of going down which the mobile radio terminal set as received data in the decoder section 1102 measured is acquired (Step 1301), and it is notified to the transmitting output-control section 1106. When the transmitting output of the present base transceiver station is memorized and the rate of a framing error is notified from the decoder section 1102, the transmitting output-control section 1106 controls the amplification controller 1107, and makes a transmitting output fluctuate so that the rate of a framing error may fit in the fixed range according to the value (Steps 1302-1303).

[0010] Moreover, a base transceiver station measures the rate of a framing error of the electric wave of the uphill direction channel from a mobile radio terminal to JP,07-030482,A, and performs the transmitting output control of a base transceiver station to it, and the technology of a mobile radio terminal getting down from a base transceiver station, measuring the rate of a framing error of the electric wave of a direction channel, and performing the transmitting output control of a mobile radio terminal is indicated.

[0011]

[Problem(s) to be Solved by the Invention] The output of the electric wave which a base transceiver station transmits, and the output of the electric wave which a mobile radio terminal transmits are controlled by transmitted power control in such a Prior art as what became independent mutually, respectively.

[0012] In the mobile communications by the CDMA method, the channel is formed in the diffusion modulation with a sign using the same frequency, and cochannel interference tends to arise also within \*\* and the same cell between cells which are different since the orthogonality between signs is inadequate. Especially, it has the influence of the interference level variation by phasing or the travelling-distance difference in the uphill direction channel from a mobile radio terminal to a base transceiver station, or deflection.

[0013] When the radio quality of the channel of the direction of one side deteriorates, as communication It is of the same grade as the quality in which the radio quality of the channel of other directions also deteriorated, and are enough. Although the way which coped with it by movement or hard over of the position of a mobile radio terminal etc. is a best policy from a viewpoint of mitigation of interference in the mobile communications by such CDMA method It is possible that the channel output of the direction which has not deteriorated is maintained as it is, and an electric wave is transmitted with a superfluous output depending on a situation since the channel of each direction is controlled by transmitted power control in a Prior art independently, respectively.

[0014] therefore, having performed transmitted power control in a Prior art, the uphill direction channel or when it got down, the radio quality of only one side deteriorated among direction channels and it had not been improved as it is -- if -- in the mobile communications by the CDMA method, there was a problem of giving a superfluous interference to the communication which it is with other mobile radio terminals in the same cell or the adjoining cell and a base transceiver station

[0015]

[Means for Solving the Problem] When a technical problem which was stated above is solved, the speech quality of the channel of a uni directional deteriorates and it continues, the transmitted power control unit of the mobile communications system concerning this invention also decreases the output of the electric wave of the channel of another side, mitigates the interference to other communications, and offers the transmitted power control unit which controls the transmitted power of each direction in consideration of the state of the channel of the other directions.

[0016] The mobile radio terminal with which this invention is sent out from a base transceiver station and which got down, received the electric wave of a direction and was equipped with the means to get down, to measure the rate of a framing error of an electric wave, and to notify a base transceiver station, It is the transmitted power control unit with which the base transceiver station of a mobile communications system including the aforementioned base transceiver station having a means to receive the electric wave of the going-up direction sent out from a mobile radio terminal, and to detect the received-data error of the going-up electric wave, and a means to measure received field strength is equipped, and is realized from the next composition.

(1) The going-down error rate judging section which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, will get down if the rate of a framing error of the electric wave of a direction is acquired and the thing [ that get down and the rate of a framing error of the electric wave of a direction is not improved ] is judged, and outputs electric wave quality degradation information.

(2) It is the uphill error rate judging section which computes the rate of a framing error of the electric wave of the uphill direction, and usually sets up and outputs a target received field strength value to a low value from a value when [ which the target received field strength value based on the rate of a framing error of the electric wave of the computed going-up direction is outputted, the above gets down and the error rate judging section outputs ] it gets down and electric wave quality degradation information is received.

(3) Compare the received field strength value of the electric wave of the going-up direction which carried out reception measurement with the target received field strength value which the uphill error rate judging section outputs. The received field strength value of the electric wave of the going-up direction which carried out reception measurement a low case from a target received field strength value the increase in a transmitting output Moreover, it is the received field strength judging section which outputs the information which directs reduction of a transmitting output to a mobile radio terminal, respectively when the received field strength value of the electric wave of the going-up direction which carried out reception measurement is higher than a target received field strength value.

(4) The transmitting output-control section which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, gets down based on the rate of a framing error of the electric wave of a direction, and controls the transmitting output of the electric wave of a direction.

[0017] In this invention, moreover, the aforementioned uphill error rate judging section Computed the rate of a framing error of the electric wave of the uphill direction, and it has further an uphill electric wave quality degradation judging means to go up when [ which set up beforehand the rate of a framing error which the rate of a framing error of the electric wave of the computed going-up direction set up beforehand ] it exceeds during the period, and to output electric wave quality degradation information. When the uphill electric wave quality degradation information which the uphill error rate judging section outputs is received, the aforementioned transmitting output-control section It has further 1st output-control means which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, and sets up and outputs the transmitting output of the electric wave of a direction to a low value more to get down and to set up based on the rate of a framing error of the electric wave of a direction.

[0018] Furthermore, when [ at which the transmitting output-control section gets down and the error rate judging section outputs it ] it gets down and electric wave quality degradation information is received, it is further equipped with 2nd output-control means which is notified from the mobile radio terminal

extracted from the electric wave of the uphill direction and which gets down, and sets up and outputs the transmitting output of the electric wave of a direction to a low value more get down and set up based on the rate of a framing error of the electric wave of a direction.

[0019] Moreover, the aforementioned uphill error rate judging section is further equipped with a means to usually set up and output the target received field strength value set up based on the rate of a framing error of the electric wave of the uphill direction to a low value from a value, when uphill electric wave quality degradation information is outputted.

[0020] The transmitted power control unit of this invention is further equipped with the traverse-speed test section which measures the traverse speed of a mobile radio terminal from a time change of an electric wave which receives from a mobile radio terminal, and outputs speed information, and gets down based on the speed information which a traverse-speed test section outputs, the error rate judging section changes the conditions which get down and output electric wave quality degradation information, and the uphill error rate judging section changes the conditions which output the aforementioned uphill electric wave quality degradation information.

[0021] The transmitted power control unit of this invention is further equipped with the subscriber class judging section which discriminates the subscriber class of a mobile radio terminal from the terminal-identification information included in the electric wave received from a mobile radio terminal, and, furthermore, gets down based on the subscriber class which the subscriber class judging section outputs, the error rate judging section changes the conditions which get down and output electric wave quality degradation information, and the uphill error rate judging section changes the conditions which output uphill electric wave quality degradation information.

[0022]

[Embodiments of the Invention] Next, the composition of the first of the gestalt of operation of the transmitted power control unit concerning this invention is explained with reference to a drawing.

[0023] Drawing 1 is the block diagram showing the equipment configuration by the side of the base transceiver station of the transmitted power control unit of this invention. Drawing 2 is the system concept view showing the construct in the radio area (cell) of the base transceiver station and mobile radio terminal in this invention, and shows signs that a base transceiver station 201 performs communication by the CDMA method through the mobile radio terminal 202 and electric wave which exist in the radio area L1.

[0024] In drawing 1, the transmitted power control unit of a base transceiver station consists of the following function parts.

[0025] The digital recovery section 101 inputs the signal of the uphill direction channel from a mobile radio terminal, and outputs it to the decoder section which an input signal is digitized and is mentioned later. Moreover, the received field strength of an input signal is measured and the measured value is outputted to the received field strength judging section mentioned later.

[0026] The decoder section 105 performs data error detection of the input signal digitized and outputted in the digital recovery section 101, and outputs it to the uphill error rate judging section mentioned later. Moreover, it gets down from the base transceiver station which the mobile radio terminal set as the input signal measured, and outputs to the going-down error rate judging section which extracts and mentions the error rate of an electric wave later.

[0027] The uphill error rate judging section 103 is outputted at the received field strength judging section which computes and mentions the target [ in / the uphill direction channel / based on an error rate / it had been computed and ] received field strength later while it totals the data error of the input signal inputted from the decoder section 102 and calculates an uphill error rate.

[0028] It gets down, and the error rate judging section 104 gets down from the base transceiver station which the mobile radio terminal set as the input signal which the decoder section 102 extracted measured, it performs judgment processing of the error rate of an electric wave, and notifies it to the transmitting output-control section 107 mentioned later.

[0029] The received field strength judging section 105 has the function to determine an increase/reduction of the transmitting output directed from the received field strength of an input signal,



and target received field strength to a mobile radio terminal.

[0030] The selector section 106 piles up transmitting output increase-and-decrease the data of directions sent out to the transfer data transmitted to a mobile radio terminal to the mobile radio terminal determined in the received field strength judging section 105, and outputs them to the amplification controller 108 which mentions the data signal later.

[0031] The transmitting output-control section 107 controls the transmitting output of the electric wave which a base transceiver station transmits.

[0032] The amplification controller 108 is controlled by the transmitting output-control section 107, and performs the increase and decrease of adjustment of the data signal inputted from the selector section 106.

[0033] Next, operation of the transmitted power control unit by the side of the base transceiver station constituted as mentioned above is explained with reference to drawing 1, drawing 3, and drawing 4.

[0034] Drawing 3 is a flow chart which shows operation of a transmitting output control in drawing 1 which it gets down and the error rate judging section 104 and the transmitting output-control section 107 perform, and drawing 4 is a flow chart which shows operation of transmitting output-control directions to the mobile radio terminal which the uphill error rate judging section 103 and the received field strength judging section 105 perform.

[0035] In the base transceiver station, it gets down, and it gets down to the error rate judging section 104 beforehand, and the upper limit threshold of the rate of a framing error is set to it. When [ which is sent out to a mobile radio terminal from a base transceiver station ] getting down and controlling the transmitting output of the electric wave of a direction, first, a base transceiver station extracts the rate of a framing error of the direction of going down which the mobile radio terminal reported from a mobile radio terminal measured, gets down from the value in the decoder section 102, and notifies to the error rate judging section 104 (Step 301). It gets down and comparison with a certain notified upper limit threshold of the rate of a going-down framing error beforehand set up at intervals of the period (for example, 2 seconds) is performed by getting down and accumulating the rate of a framing error of a direction in the error rate judging section 104 (Step 302). When exceeding a threshold as a result, a base transceiver station confirms whether to transmit with the maximum output now (Step 303). When the base transceiver station has transmitted with the maximum output, it gets down, and it judges that the rate of a framing error cannot improve more than it, that is gone up, and it notifies to the error rate judging section 103 (Step 304). After Step 301 - 304 ends, it gets down and the error rate judging section 104 sets up a transmitting output based on the detected rate of a going-down framing error it was notified by getting down and notifying the rate of a framing error to the transmitting output-control section 107 that the transmitting output-control section 107 was (Step 305). In a base transceiver station, an electric wave is transmitted with the transmitting output according to the set point which the transmitting output-control section 107 set up.

[0036] That is, a transmitting output is raised towards improving it, when the rate of a framing error is bad, and when the rate of a framing error is too good, a transmitting output is lowered in order to lessen interference to other communications. Of course, when the transmitting output is the maximum, even if the rate of a framing error is bad, a transmitting output cannot be raised more than it.

[0037] Moreover, in order to perform the output control of the electric wave of the going-up direction from a mobile radio terminal, if an electric wave is received from a mobile radio terminal, a base transceiver station will measure the received field strength of a received electric wave in the digital recovery section 101, and will notify the result to the received field strength judging section 105 (Step 401). As for the signal digitized in the digital recovery section 101, error detection of received data is performed in the decoder section 102, and the error detection result goes up and is notified to the error rate judging section 103 (Step 402). There is the uphill error rate judging section 103, it carries out periodic (for example, 2 seconds) accumulation of the error detection result, and computes the rate of an uphill framing error after the period (Step 403) (Step 405). It is confirmed whether the uphill error rate judging section 103 has the notice with the state where the rate of a framing error which gets down and gets down from the error rate judging section 104 like the above-mentioned after computing the rate of

an uphill framing error is not improvable (Step 406).

[0038] When there is no notice, the uphill error rate judging section 103 sets up target received field strength from the rate of an uphill framing error (Step 408). When a notice is received, the uphill error rate judging section 103 sets the target received field strength set up from the rate of an uphill framing error as the value which becomes lower than the usual value (Step 407). The uphill error rate judging section 103 notifies target received field strength to the received field strength judging section 105 after setting up target received field strength. In the received field strength judging section 105, comparison with the received field strength of the electric wave of the going-up direction notified from the digital recovery section 101 and the target received field strength notified from the uphill error rate judging section 103 is performed (Step 409), and when received field strength is smaller than target received field strength, it opts for increase directions of the transmitting output to a mobile radio terminal (Step 410). When received field strength is larger than target received field strength, it opts for reduction directions of the transmitting output to a mobile radio terminal (Step 411). The received field strength judging section 105 notifies the increase or reduction directions of a transmitting output to the mobile radio terminal determined by Step 410 or Step 411 to the selector section 106. In the selector section 106, increase in transmitting output / reduction directions to the notified mobile radio terminal are laid on top of transfer data, and it gets down, it outputs as a signal of a direction channel, and notifies to a mobile radio terminal.

[0039] In the above control, since target received field strength is set up lower than usual when it gets down and the rate of a framing error is not improved, increase/reduction directions of the transmitting output to the mobile radio terminal judged in the received field strength judging section 105 will work in the reduction direction. The transmitting output of a mobile radio terminal will decrease from usual as the result.

[0040] Moreover, in case target received field strength is set up, after setting up target received field strength previously, it may confirm that the rate of a framing error from which it gets down is not improved, and correction may be added to the value of target received field strength by the result.

[0041] Thus, in the gestalt of implementation of the first invention, if it judges that it is in the state where get down and degradation of the speech quality of a direction channel is not improved, raising the output of the electric wave of the uphill direction channel by force can perform control which does not give the interference to other telephone calls as much as possible, without carrying out.

[0042] Next, the gestalt of operation of the second of the transmitted power control unit concerning this invention is explained with reference to drawing 1, drawing 5, and drawing 6.

[0043] The composition of the equipment in a base transceiver station is the same as the gestalt of the first operation, and refer to drawing 1 for it. Drawing 5 and drawing 6 are flow charts which show operation of the gestalt of the second operation, and show operation concerning the output control of the electric wave which a base transceiver station transmits, and operation concerning the output control of the electric wave which the mobile radio terminal notified from a base transceiver station to a mobile radio terminal sends out, respectively.

[0044] First, the output control of the electric wave of the direction channel of going down which a base transceiver station sends out with reference to drawing 5 is explained.

[0045] In the base transceiver station, it gets down, and it gets down to the error rate judging section 104 beforehand, and the upper limit threshold of the rate of a framing error is set to it. When [ which is sent out to a mobile radio terminal from a base transceiver station ] getting down and controlling the transmitting output of the electric wave of a direction, first, a base transceiver station extracts the rate of a framing error of the direction of going down which the mobile radio terminal reported from a mobile radio terminal measured, gets down from the value in the decoder section 102, and notifies to the error rate judging section 104 (Step 501). It gets down and comparison with a certain notified upper limit threshold of the rate of a going-down framing error beforehand set up at intervals of the period (for example, 2 seconds) is performed by getting down and accumulating the rate of a framing error of a direction in the error rate judging section 104 (Step 502). When exceeding a threshold as a result, a base transceiver station confirms whether to transmit with the maximum output now (Step 503). When the

base transceiver station has transmitted with the maximum output, it gets down, and it judges that the rate of a framing error cannot improve more than it, that is gone up, and it notifies to the error rate judging section 103 (Step 504). After Step 501 - 504 ends, it gets down and the error rate judging section 104 notifies the detected rate of a going-down framing error to the transmitting output-control section 107. In the transmitting output-control section 107, although it gets down and the transmitting output of a base transceiver station is set up based on the rate of a framing error, it is confirmed whether in that case, go up so that it may mention later that it cannot improve while [ in which the rate of an uphill framing error deteriorated ] it got down and had been notified from the error rate judging section 104, and it is notified from the error rate judging section 103 (Step 505). It gets down and the transmitting output-control section 107 sets up a transmitting output based on the rate of a framing error, when there is no notice (Step 507). When there is a notice, in case it gets down and the transmitting output-control section 107 sets up a transmitting output based on the rate of a framing error, it sets the set point as a low value from usual (Step 506).

[0046] And the electric wave from a base transceiver station is transmitted with the transmitting output according to the value set up in this way.

[0047] When it confirms that the rate of an uphill framing error is not improvable and the rate of an uphill framing error cannot be improved after the above control opts for a transmitting output previously, it may add correction so that it may transmit lower than usual.

[0048] Next, operation concerning control of the transmitting output directed to a mobile radio terminal with reference to drawing 6 is explained.

[0049] It goes up to the uphill error rate judging section 103 of a base transceiver station with the rate upper limit threshold of an uphill framing error beforehand, and the continuation degradation counter upper limit threshold is set to it. A base transceiver station performs error detection of an input signal in the decoder section 102 of the electric wave which was mentioned above and which was received from the mobile radio terminal like the gestalt of the first operation, and notifies to the uphill error rate judging section 103. In the uphill error rate judging section 103, the uphill rate of a framing error is computed after fixed period progress (for example, 2 seconds) (Steps 601-605).

[0050] The uphill error rate judging section 103 adds an uphill continuation degradation counter, when it exceeds a threshold as compared with the rate upper limit threshold of an uphill framing error which it had been computed and is beforehand set up in the rate of a framing error next (Step 606) (Step 607). When that is not right, an uphill continuation degradation counter is cleared (Step 608). Furthermore, it judges that the rate of a framing error of the uphill direction can deteriorate the uphill error rate judging section 103, and cannot improve it when an uphill continuation degradation counter value goes up the counter value as compared with the uphill continuation degradation counter upper limit threshold set up beforehand (Step 609) and it is over the continuation degradation counter upper limit threshold after the uphill continuation degradation counter setup, and that notifies to the transmitting output-control section 107 (Step 610).

[0051] Then, it is confirmed whether the uphill error rate judging section 103 has the notice with the state where the rate of a framing error which gets down and gets down from the error rate judging section 104 like the above-mentioned is not improvable (Step 611).

[0052] When there is no notice, the uphill error rate judging section 103 sets up target received field strength from the rate of an uphill framing error (Step 613). When a notice is received, the uphill error rate judging section 103 sets the target received field strength set up from the rate of an uphill framing error as the value which becomes lower than the usual value (Step 612). The uphill error rate judging section 103 notifies target received field strength to the received field strength judging section 105 after setting up target received field strength. In the received field strength judging section 105, comparison with the received field strength of the electric wave of the going-up direction notified from the digital recovery section 101 and the target received field strength notified from the uphill error rate judging section 103 is performed (Step 614), and when received field strength is smaller than target received field strength, it opts for increase directions of the transmitting output to a mobile radio terminal (Step 615). When received field strength is larger than target received field strength, it opts for reduction

directions of the transmitting output to a mobile radio terminal (Step 611). The received field strength judging section 105 notifies the increase or reduction directions of a transmitting output to the mobile radio terminal determined by Step 615 or Step 616 to the selector section 106. In the selector section 106, increase in transmitting output / reduction directions to the notified mobile radio terminal are laid on top of transfer data, and it gets down, it outputs as a signal of a direction channel, and notifies to a mobile radio terminal.

[0053] In the above control, since target received field strength is set up lower than usual when it gets down and the rate of a framing error is not improved, increase/reduction directions of the transmitting output to the mobile radio terminal judged in the received field strength judging section 105 will work in the reduction direction. The transmitting output of a mobile radio terminal will decrease from usual as the result.

[0054] Thus, in the gestalt of implementation of the second invention, it judges, respectively that get down with the uphill direction and degradation of the speech quality of each channel of a direction is not improved, and when degradation of the speech quality of the channel of other directions is not improved, raising the output of the electric wave of the channel of the self-direction by force can perform control which does not give the interference to other communications as much as possible, without carrying out.

[0055] Then, the gestalt of operation of the third of the transmitted power control unit concerning this invention is explained with reference to drawing 1 , drawing 7 , and drawing 8 .

[0056] The composition of the equipment in a base transceiver station is the same as the gestalt of the first operation, and refer to drawing 1 for it. Drawing 7 and drawing 8 are flow charts which show operation of the gestalt of the third operation, and show operation concerning the output control of the electric wave which a base transceiver station transmits, and operation concerning the output control of the electric wave which the mobile radio terminal notified from a base transceiver station to a mobile radio terminal sends out, respectively.

[0057] First, the output control of the electric wave of the direction channel of going down which a base transceiver station sends out with reference to drawing 7 is explained.

[0058] A base transceiver station gets down and the rate upper limit threshold of the going-down framing error which gets down and is beforehand set up with the rate of a framing error of a direction which extracted the error rate judging section 104 in the decoder section 102 like the transmitting output control explained with the gestalt of the first operation, and was notified is compared (Step 701,702). And when it gets down, the rate of a framing error of a direction gets down and it exceeds the rate upper limit threshold of a framing error, a base transceiver station confirms whether transmit with the maximum output now (Step 703). When the base transceiver station has transmitted with the maximum output, it gets down, and judges that the rate of a framing error is not improvable, that is gone up, and it notifies to the error rate judging section 103 (Step 704). And if it cannot improve to the transmitting output-control section 107, with the rate of an uphill framing error deteriorated, that there is a notice will notify whether it is nothing that it does not change, but it gets down and the set point of a transmitting output is set as a low value from usual based on the rate of a framing error. The transmitting output-control section 107 sets the set point of a transmitting output as a low value from usual with the directions, gets down from a base transceiver station (Step 705), and outputs the electric wave of a direction channel.

[0059] On the other hand, when the base transceiver station has not transmitted with the maximum output now, it gets down with that and the rate of a framing error is notified to the transmitting output-control section 107. In the transmitting output-control section 107, although it gets down and the transmitting output of a base transceiver station is set up based on the rate of a framing error, it is confirmed whether in that case, go up so that it may mention later that it cannot improve while [ in which the rate of an uphill framing error deteriorated ] it got down and had been notified from the error rate judging section 104, and it is notified from the error rate judging section 103 (Step 706). It gets down and the transmitting output-control section 107 sets up a transmitting output based on the rate of a framing error, when there is no notice (Step 708). When there is a notice, in case it gets down and a

transmitting output is set up based on the rate of a framing error, the set point is set as a low value from usual (Step 707).

[0060] Next, operation concerning control of the transmitting output directed to a mobile radio terminal with reference to drawing 8 is explained.

[0061] The uphill error rate judging section 103 of a base transceiver station Like the transmitting output control of the mobile radio terminal in the base transceiver station which explained with the gestalt of the second operation In order to confirm whether it can improve while it goes up with the rate upper limit threshold of an uphill framing error, the continuation degradation counter upper limit threshold is set up beforehand and the rate of a framing error of the uphill direction had deteriorated Compute the rate of an uphill framing error after a certain periodic (for example, 2 seconds) progress, and comparison with the rate upper limit threshold of an uphill framing error is performed. A continuation degradation counter is set up (Steps 801-808), and comparison of a continuation degradation counter and a continuation degradation counter upper limit threshold is performed (Step 809). If it cannot improve while it judged that the uphill error rate judging section 103 could not improve the rate of a framing error of the uphill direction when a continuation degradation counter exceeds a continuation degradation counter upper limit threshold, it notified and (Step 810) got down from that to the transmitting output-control section 107 and the rate of a framing error had deteriorated, it will not change, but that there is a notice will set [ whether it is nothing and ] up so that it may become lower than usual about target received field strength (Step 811).

[0062] Then, it is confirmed whether the uphill error rate judging section 103 has the notice with the state where the rate of a framing error which gets down and gets down from the error rate judging section 104 like the above-mentioned is not improvable (Step 812).

[0063] When there is no notice, the uphill error rate judging section 103 sets up target received field strength from the rate of an uphill framing error (Step 814). When a notice is received, the uphill error rate judging section 103 sets the target received field strength set up from the rate of an uphill framing error as the value which becomes lower than the usual value (Step 813). The uphill error rate judging section 103 notifies target received field strength to the received field strength judging section 105 after setting up target received field strength. In the received field strength judging section 105, comparison with the received field strength of the electric wave of the going-up direction notified from the digital recovery section 101 and the target received field strength notified from the uphill error rate judging section 103 is performed (Step 815), and when received field strength is smaller than target received field strength, it opts for increase directions of the transmitting output to a mobile radio terminal (Step 816). When received field strength is larger than target received field strength, it opts for reduction directions of the transmitting output to a mobile radio terminal (Step 817). The received field strength judging section 105 notifies the increase or reduction directions of a transmitting output to the mobile radio terminal determined by Step 816 or Step 817 to the selector section 106. In the selector section 106, increase in transmitting output / reduction directions to the notified mobile radio terminal are laid on top of transfer data, and it gets down and notifies to a mobile radio terminal as a signal of a direction channel.

[0064] Thus, in the gestalt of implementation of the third invention, when it judges, respectively that get down with the uphill direction and degradation of the speech quality of each channel of a direction is not improved and judges with degradation of the speech quality of the channel of the self-direction not being improved, regardless of the degradation situation of the speech quality of the channel of the other directions, the output of the electric wave of the channel of the self-direction can be lowered, and control which does not give the interference to other telephone calls as much as possible can be performed.

[0065] Furthermore, the gestalt of operation of the fourth of the transmitted power control unit concerning this invention is explained with reference to drawing 9.

[0066] Drawing 9 is the block diagram showing the composition of the transmitted power control unit in a base transceiver station, and it has the same function in this drawing except for the digital recovery section 901, the decoder section 902, the uphill error rate judging section 903, each functional block of composition of that the error rate judging section 904, the received field strength test section 905, the

selector section 906, the transmitting output-control section 907, and the amplification controller 909 were shown in drawing 1 by getting down, and the point mentioned later.

[0067] In the composition of the gestalt of this operation, it has the traverse-speed test section 908, and this traverse-speed test section 908 measures time transition of the received field strength which receives from a mobile radio terminal, extracts the speed feature factor, presumes the speed of a mobile radio terminal, usually classifies the mobile radio terminal under communication into the two move modes of the move mode with the high-speed move mode, and has the function which outputs the information.

[0068] The rate upper limit threshold for the move modes of an uphill framing error and the uphill continuation degradation counter upper limit threshold for the usual move modes, and the rate upper limit threshold for the high-speed move modes of an uphill framing error and the uphill continuation degradation counter upper limit threshold for the high-speed move modes are usually beforehand set to the uphill error rate judging section 903 of a base transceiver station. Moreover, it gets down and the rate upper limit threshold for the move modes of a going-down framing error and the rate upper limit threshold for the high-speed move modes of a going-down framing error are usually beforehand set to the error rate judging section 904.

[0069] This is the disposal in consideration of the case where they are the uphill direction channel or the thing which it gets down and degradation of the speech quality of a direction channel depends on local influence. Since it is thought that time to probably exist in the area will probably be temporary when the mobile radio terminal is carrying out high-speed movement, even if degradation of a speech quality is detected there, possibility of passing through the area immediately and returning to the quality of a basis again will be high. It is not desirable to judge such a thing as degradation of a speech quality uniformly, and to degrade the channel quality of other directions.

[0070] Then, even if it is usually the method of having so far explained control action to the mobile radio terminal of the high-speed move mode performing transmitted power control by the method explained so far by the move mode in speed, the threshold for judging with quality degradation is set up more highly, and even when judged with quality degradation, by the high-speed move mode, a measure is usually taken at the move mode so that it may not be judged with quality degradation.

[0071] Moreover, the threshold may make both of the modes the same, and the method of changing the calculation period of an error rate is sufficient as it. Though the calculation period of an error rate is lengthened and there is aggravation of an actual error rate, it can also prevent from being immediately judged with degradation of a speech quality in the case of the high-speed move mode.

[0072] Thus, the judgment means of the move mode and two kinds of high-speed move modes is usually prepared in the uphill error rate judging section 903 and the going-down error rate judging section 904, respectively.

[0073] During communication with a mobile radio terminal, the mobile radio terminal is discriminating whether it is the high-speed move mode and whether it is usually the move mode, and goes up the information in the traverse-speed judging section 908, and a base transceiver station notifies to the error rate judging section 903 and the going-down error rate judging section 904. When the move mode of a mobile radio terminal usually shifts to the move mode from high-speed move MODOHE from the move mode, or the high-speed move mode, the traverse-speed judging section 908 goes up the move mode change information on a mobile radio terminal, and notifies it to the error rate judging section 903 and the going-down error rate judging section 904, respectively. The uphill error rate judging section 903 and the speech quality judging corresponding to each move mode if the error rate judging section 904 receives the notice of the move mode of a mobile radio terminal from the traverse-speed judging section 908 by getting down are performed, and transmitted power control is performed according to it.

[0074] Drawing 10 is the block diagram showing the gestalt of operation of the fifth of this invention, and has the composition that the subscriber class judging section 1009 was added to the composition of drawing 9.

[0075] In this drawing, it has the same function except for the digital recovery section 1001, the decoder section 1002, the uphill error rate judging section 1003, functional each block of composition of that the error rate judging section 1004, the received field strength test section 1005, the selector section 1006,

the transmitting output-control section 1007, and the amplification controller 1010 were shown in drawing 9 by getting down, and the point mentioned later. The subscriber class judging section 1009 classifies the subscriber class of the mobile radio terminal under present communication into a priority subscriber class and an ordinary subscriber class according to a subscriber's number, and has the function which outputs the information.

[0076] The rate upper limit threshold for priority subscribers of an uphill framing error, the rate upper limit threshold for priority subscribers of an uphill framing error, and the uphill continuation degradation counter upper limit threshold for priority subscribers are beforehand set to the uphill error rate judging section 1003 of a base transceiver station. Moreover, it gets down and the rate upper limit threshold for priority subscribers of a going-down framing error is beforehand set to the error rate judging section 1004.

[0077] This is the disposal which took into consideration change by the subscriber class of a mobile radio terminal to the criterion which degrades other good channel quality the uphill direction channel or when it gets down and there is degradation of the speech quality of a direction channel. When priority attachment is done by the ordinary subscriber with public responsibility for which a mobile radio terminal is used in the public government office of the police, fire fighting, or others, it may not be desirable to make the same as that of an ordinary subscriber the criterion which it judges [ criterion ] as degradation of a speech quality and degrades the channel quality of other directions.

[0078] Then, an ordinary subscriber receives the mobile radio terminal to which the subscriber class with a high priority was given noting that he performs transmitted power control by the method explained so far. Even if control action is a method explained so far, it sets up the threshold for judging with quality degradation more highly, and at an ordinary subscriber's mobile radio terminal, even when judged with quality degradation, it deals with it with a mobile radio terminal with a high priority, so that it may not be judged with quality degradation.

[0079] Moreover, both thresholds may be made the same and the method of changing the calculation period of an error rate is sufficient as them. Though the calculation period of an error rate is lengthened and there is aggravation of an actual error rate, it can also prevent from being immediately judged with degradation of a speech quality in the case of a subscriber class with a high priority.

[0080] Thus, two kinds of judgment meanses, the object for ordinary subscribers and the object for priority subscribers, are prepared in the uphill error rate judging section 1003 and the going-down error rate judging section 1004, respectively.

[0081] In case a mobile radio terminal communicates with a base transceiver station, from the data received in the decoder section 1002, the subscriber's number of a mobile radio terminal is acquired, the subscriber class judging section 1009 judges whether you are a priority subscriber and whether a mobile radio terminal is an ordinary subscriber from the subscriber's number, and in the case of a priority subscriber, that is gone up, and it notifies it to the error rate judging section 1003 and the going-down error rate judging section 1004. The uphill error rate judging section 1003 and the speech quality judging corresponding to each subscriber class if the error rate judging section 1004 receives the notice of the subscriber class of the mobile radio terminal under communication from the subscriber class judging section 1009 by getting down are performed, and transmitted power control is performed according to it.

[0082]

[Effect of the Invention] As explained above, in the mobile communications which used the CDMA method, it gets down, and the transmitted power control unit concerning this invention can mitigate the interference to other communications by superfluous power sending out by lowering the output of the channel of another side, going up / when the communication quality of one of the two's channel deteriorates and does not improve among direction channels.

[0083] With the form of operation of the first of this invention, when it gets down and degradation of the communication quality of a direction channel does not improve, it has the composition of directing a low value from the output which should originally be sent out as a transmitting output of the uphill direction channel, and there is an effect which mitigates the interference to other communications by the

electric wave of the uphill direction channel.

[0084] When the degradation situation of the channel of the other directions is not improved, the composition which sets up a low value and carries out output directions has consisted of the output which should originally send out as a transmitting output of the channel of the self-direction, and when the speech quality of which direction deteriorated, with the gestalt of operation of the second of this invention, the effect which mitigates the interference to other telephone calls by the electric wave of it and the direction channel which counter is.

[0085] With the gestalt of operation of the third of this invention, when the degradation situation of the channel of the self-direction is not improved, it has composition which sets up a low value and carries out output directions rather than the output which should originally be sent out as a transmitting output of the self-direction channel regardless of the degradation situation of the channel of the other directions. therefore, in addition to the effect of the gestalt of the second operation, the interference to other communications by the electric wave of the self-direction channel is mitigated -- it is effective

[0086] The criterion of degradation of communication quality is made into criteria looser than the criterion of the mobile radio terminal which is usually moving to the mobile radio terminal which is carrying out high-speed movement, and it is made not to make temporary degradation judge with the gestalt of operation of the fourth of this invention for mobile radio terminals which are carrying out high-speed movement, such as degradation of the communication quality only resulting from a judgment area. Therefore, the output of the channel of a normal direction is reduced recklessly and it can avoid degrading communication quality unconditionally.

[0087] With the gestalt of operation of the fifth of this invention, the mobile radio terminal of general subscription and the mobile radio terminal which gave the high priority of public responsibility are discriminated. The criterion of degradation of communication quality is made into criteria looser than the criterion of the mobile radio terminal of general subscription to the mobile radio terminal which gave the high priority of public responsibility. The output of the channel of a normal direction is reduced recklessly and it can avoid degrading communication quality unconditionally.

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**TECHNICAL FIELD**

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[The technical field to which invention belongs] Especially this invention relates to the transmitted power control unit which performs the transmitting output control which got down with the uphill direction channel and took into consideration each radio quality of a direction channel in the mobile communications system which used the CDMA (Code Division Multiple Access: sign diffusion multiplexing) method for communication with a base transceiver station and a mobile radio terminal about the transmitted power control unit of a mobile communications system.

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**PRIOR ART**

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[Description of the Prior Art] Drawing 11 reference AN OVERVIEW OF THE APPLICATION OF CODE DIVISION MULTIPLE ACCESS(CDMA) TO DIGITAL CELLULAR SYSTEMS AND PERSONAL CELLULAR NETWORKS (Ann exaggerated view ) OBU THE Application OBU code Division Multiple Access (SHIDEEMUE) toe Digital one Cellular Systems and -- personal -- cellular it can set to the conventional mobile communications system currently indicated by networks -- It is the block diagram showing the equipment configuration concerning the transmitting output control in a base transceiver station. Drawing 12 is a flow chart which shows the control action of the uphill direction channel of the transmitting output control in the equipment configuration shown in drawing 11 . The transmitting output control of drawing 11 gets down, and drawing 13 is the flow chart of the control action of a direction channel.

[0003] A base transceiver station gets down with the transmitting output control of the electric wave of the uphill direction channel of a mobile radio terminal, and the conventional transmitting output control is performing independently the transmitting output control of the electric wave of a direction channel. The transmitting output control of the electric wave of the uphill direction channel is performed as follows.

[0004] In a base transceiver station, the received field strength of the electric wave of the received uphill direction channel is measured in the digital recovery section 1101 (Step 1201), and it is notified to the received field strength judging section 1104. Moreover, in the decoder section 1102, error detection of received data is performed (Step 1202), the result is gone up, and it notifies to the error rate judging section 1103.

[0005] In the uphill error rate judging section, fixed period (for example, 2 seconds) accumulation of the result of the error detection which received the notice is carried out, and the rate of a framing error is computed based on them (Steps 1203-1205). Moreover, in the uphill error rate judging section 1103, the rate of a target framing error is set up beforehand, and target received field strength is computed. And in the uphill framing error judging section 1103, from the computed rate of a framing error, correction is added to target received field strength, target received field strength is set up anew (Step 1206), and it is notified to the received field strength judging section 1104.

[0006] The target received field strength beforehand notified from the uphill error rate judging section 1103 in the received field strength judging section 1104 when an electric wave is received from a mobile radio terminal, Received field strength measured at the time of the reception of the electric wave of the uphill direction channel which received the notice from the digital recovery section 1101 is measured (Step 1207). Consequently, when received field strength is larger than target received field strength, to a mobile radio terminal, it gets down and transmitting output reduction directions are performed by the electric wave of a direction channel (Step 1209). When received field strength is smaller than target received field strength, the increase directions in a transmitting output are performed to a mobile radio terminal (Step 1208).

[0007] Moreover, it gets down and the transmitting output control of the electric wave of a direction is performed as follows.

[0008] Also in a mobile radio terminal, the rate of a framing error of the electric wave of the received direction channel of going down is measured.

[0009] And the result is put on the electric wave of the uphill direction channel at a fixed interval (for example, 2 seconds), and a base transceiver station is notified of it at it. In a base transceiver station, the rate of a framing error of the electric wave of the direction channel of going down which the mobile radio terminal set as received data in the decoder section 1102 measured is acquired (Step 1301), and it is notified to the transmitting output-control section 1106. When the transmitting output of the present base transceiver station is memorized and the rate of a framing error is notified from the decoder section 1102, the transmitting output-control section 1106 controls the amplification controller 1107, and makes a transmitting output fluctuate so that the rate of a framing error may fit in the fixed range according to the value (Steps 1302-1303).

[0010] Moreover, a base transceiver station measures the rate of a framing error of the electric wave of the uphill direction channel from a mobile radio terminal to JP,07-030482,A, and performs the transmitting output control of a base transceiver station to it, and the technology of a mobile radio terminal getting down from a base transceiver station, measuring the rate of a framing error of the electric wave of a direction channel, and performing the transmitting output control of a mobile radio terminal is indicated.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] As explained above, in the mobile communications which used the CDMA method, it gets down, and the transmitted power control unit concerning this invention can mitigate the interference to other communications by superfluous power sending out by lowering the output of the channel of another side, going up / when the communication quality of one of the two's channel deteriorates and does not improve among direction channels.

[0083] With the form of operation of the first of this invention, when it gets down and degradation of the communication quality of a direction channel does not improve, it has the composition of directing a low value from the output which should originally be sent out as a transmitting output of the uphill direction channel, and there is an effect which mitigates the interference to other communications by the electric wave of the uphill direction channel.

[0084] When the degradation situation of the channel of the other directions is not improved, with the form of operation of the second of this invention, the composition which sets up a low value and carries out output directions has consisted of the output which should originally send out as a transmitting output of the channel of the self-direction, and when the speech quality of which direction deteriorated, the effect which mitigates the interference to other telephone calls by the electric wave of it and the direction channel which counter is.

[0085] With the form of operation of the third of this invention, when the degradation situation of the channel of the self-direction is not improved, it has composition which sets up a value lower than the output which should originally be sent out as a transmitting output of the self-direction channel regardless of the degradation situation of the channel of the other directions, and carries out output directions. therefore, in addition to the effect of the form of the second operation, the interference to other communications by the electric wave of the self-direction channel is mitigated -- it is effective

[0086] The criterion of degradation of communication quality is made into criteria looser than the criterion of the mobile radio terminal which is usually moving to the mobile radio terminal which is carrying out high-speed movement, and it is made not to make temporary degradation judge with the form of operation of the fourth of this invention for mobile radio terminals which are carrying out high-speed movement, such as degradation of the communication quality only resulting from a judgment area. Therefore, the output of the channel of a normal direction is reduced recklessly and it can avoid degrading communication quality unconditionally.

[0087] As opposed to the mobile radio terminal which discriminated the mobile radio terminal of general subscription, and the mobile radio terminal which gave the high priority of public responsibility with the form of operation of the fifth of this invention, and gave the high priority of public responsibility The criterion of degradation of \*\*\*\* quality is made into criteria looser than the criterion of the mobile radio terminal of general subscription, the output of the channel of a normal direction is reduced recklessly, and it can avoid degrading communication quality unconditionally.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] The output of the electric wave which a base transceiver station transmits, and the output of the electric wave which a mobile radio terminal transmits are controlled by transmitted power control in such a Prior art as what became independent mutually, respectively.

[0012] In the mobile communications by the CDMA method, the channel is formed in the diffusion modulation with a sign using the same frequency, and cochannel interference tends to arise also within \*\* and the same cell between cells which are different since the orthogonality between signs is inadequate. Especially, it has the influence of the interference level variation by phasing or the travelling-distance difference in the uphill direction channel from a mobile radio terminal to a base transceiver station, or deflection.

[0013] When the radio quality of the channel of the direction of one side deteriorates, as communication It is of the same grade as the quality in which the radio quality of the channel of other directions also deteriorated, and are enough. Although the way which coped with it by movement or hard over of the position of a mobile radio terminal etc. is a best policy from a viewpoint of mitigation of interference in the mobile communications by such CDMA method It is possible that the channel output of the direction which has not deteriorated is maintained as it is, and an electric wave is transmitted with a superfluous output depending on a situation since the channel of each direction is controlled by transmitted power control in a Prior art independently, respectively.

[0014] therefore, having performed transmitted power control in a Prior art, the uphill direction channel or when it got down, the radio quality of only one side deteriorated among direction channels and it had not been improved as it is -- if -- in the mobile communications by the CDMA method, there was a problem of giving a superfluous interference to the communication which it is with other mobile radio terminals in the same cell or the adjoining cell and a base transceiver station

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## MEANS

[Means for Solving the Problem] When a technical problem which was stated above is solved, the speech quality of the channel of a uni directional deteriorates and it continues, the transmitted power control unit of the mobile communications system concerning this invention also decreases the output of the electric wave of the channel of another side, mitigates the interference to other communications, and offers the transmitted power control unit which controls the transmitted power of each direction in consideration of the state of the channel of the other directions.

[0016] The mobile radio terminal with which this invention is sent out from a base transceiver station and which got down, received the electric wave of a direction and was equipped with the means to get down, to measure the rate of a framing error of an electric wave, and to notify a base transceiver station, It is the transmitted power control unit with which the base transceiver station of a mobile communications system including the aforementioned base transceiver station having a means to receive the electric wave of the going-up direction sent out from a mobile radio terminal, and to detect the received-data error of the going-up electric wave, and a means to measure received field strength is equipped, and is realized from the next composition.

(1) The going-down error rate judging section which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, will get down if the rate of a framing error of the electric wave of a direction is acquired and the thing [ that get down and the rate of a framing error of the electric wave of a direction is not improved ] is judged, and outputs electric wave quality degradation information.

(2) It is the uphill error rate judging section which computes the rate of a framing error of the electric wave of the uphill direction, and usually sets up and outputs a target received field strength value to a low value from a value when [ which the target received field strength value based on the rate of a framing error of the electric wave of the computed going-up direction is outputted, the above gets down and the error rate judging section outputs ] it gets down and electric wave quality degradation information is received.

(3) Compare the received field strength value of the electric wave of the going-up direction which carried out reception measurement with the target received field strength value which the uphill error rate judging section outputs. The received field strength value of the electric wave of the going-up direction which carried out reception measurement a low case from a target received field strength value the increase in a transmitting output Moreover, it is the received field strength judging section which outputs the information which directs reduction of a transmitting output to a mobile radio terminal, respectively when the received field strength value of the electric wave of the going-up direction which carried out reception measurement is higher than a target received field strength value.

(4) The transmitting output-control section which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, gets down based on the rate of a framing error of the electric wave of a direction, and controls the transmitting output of the electric wave of a direction.

[0017] In this invention, moreover, the aforementioned uphill error rate judging section Computed the

rate of a framing error of the electric wave of the uphill direction, and it has further an uphill electric wave quality degradation judging means to go up when [ which set up beforehand the rate of a framing error which the rate of a framing error of the electric wave of the computed going-up direction set up beforehand ] it exceeds during the period, and to output electric wave quality degradation information. When the uphill electric wave quality degradation information which the uphill error rate judging section outputs is received, the aforementioned transmitting output-control section It has further 1st output-control means which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, and sets up and outputs the transmitting output of the electric wave of a direction to a low value more to get down and to set up based on the rate of a framing error of the electric wave of a direction.

[0018] Furthermore, when [ at which the transmitting output-control section gets down and the error rate judging section outputs it ] it gets down and electric wave quality degradation information is received, it is further equipped with 2nd output-control means which is notified from the mobile radio terminal extracted from the electric wave of the uphill direction and which gets down, and sets up and outputs the transmitting output of the electric wave of a direction to a low value more get down and set up based on the rate of a framing error of the electric wave of a direction.

[0019] Moreover, the aforementioned uphill error rate judging section is further equipped with a means to usually set up and output the target received field strength value set up based on the rate of a framing error of the electric wave of the uphill direction to a low value from a value, when uphill electric wave quality degradation information is outputted.

[0020] The transmitted power control unit of this invention is further equipped with the traverse-speed test section which measures the traverse speed of a mobile radio terminal from a time change of an electric wave which receives from a mobile radio terminal, and outputs speed information, and gets down based on the speed information which a traverse-speed test section outputs, the error rate judging section changes the conditions which get down and output electric wave quality degradation information, and the uphill error rate judging section changes the conditions which output the aforementioned uphill electric wave quality degradation information.

[0021] The transmitted power control unit of this invention is further equipped with the subscriber class judging section which discriminates the subscriber class of a mobile radio terminal from the terminal-identification information included in the electric wave received from a mobile radio terminal, and, furthermore, gets down based on the subscriber class which the subscriber class judging section outputs, the error rate judging section changes the conditions which get down and output electric wave quality degradation information, and the uphill error rate judging section changes the conditions which output uphill electric wave quality degradation information.

[0022]

[Embodiments of the Invention] Next, the composition of the first of the gestalt of operation of the transmitted power control unit concerning this invention is explained with reference to a drawing.

[0023] Drawing 1 is the block diagram showing the equipment configuration by the side of the base transceiver station of the transmitted power control unit of this invention. Drawing 2 is the system concept view showing the construct in the radio area (cell) of the base transceiver station and mobile radio terminal in this invention, and shows signs that a base transceiver station 201 performs communication by the CDMA method through the mobile radio terminal 202 and electric wave which exist in the radio area L1.

[0024] In drawing 1, the transmitted power control unit of a base transceiver station consists of the following function parts.

[0025] The digital recovery section 101 inputs the signal of the uphill direction channel from a mobile radio terminal, and outputs it to the decoder section which an input signal is digitized and is mentioned later. Moreover, the received field strength of an input signal is measured and the measured value is outputted to the received field strength judging section mentioned later.

[0026] The decoder section 105 performs data error detection of the input signal digitized and outputted in the digital recovery section 101, and outputs it to the uphill error rate judging section mentioned later.

Moreover, it gets down from the base transceiver station which the mobile radio terminal set as the input signal measured, and outputs to the going-down error rate judging section which extracts and mentions the error rate of an electric wave later.

[0027] The uphill error rate judging section 103 is outputted at the received field strength judging section which computes and mentions the target [ in / the uphill direction channel / based on an error rate / it had been computed and ] received field strength later while it totals the data error of the input signal inputted from the decoder section 102 and calculates an uphill error rate.

[0028] It gets down, and the error rate judging section 104 gets down from the base transceiver station which the mobile radio terminal set as the input signal which the decoder section 102 extracted measured, it performs judgment processing of the error rate of an electric wave, and notifies it to the transmitting output-control section 107 mentioned later.

[0029] The received field strength judging section 105 has the function to determine an increase/reduction of the transmitting output directed from the received field strength of an input signal, and target received field strength to a mobile radio terminal.

[0030] The selector section 106 piles up transmitting output increase-and-decrease the data of directions sent out to the transfer data transmitted to a mobile radio terminal to the mobile radio terminal determined in the received field strength judging section 105, and outputs them to the amplification controller 108 which mentions the data signal later.

[0031] The transmitting output-control section 107 controls the transmitting output of the electric wave which a base transceiver station transmits.

[0032] The amplification controller 108 is controlled by the transmitting output-control section 107, and performs the increase and decrease of adjustment of the data signal inputted from the selector section 106.

[0033] Next, operation of the transmitted power control unit by the side of the base transceiver station constituted as mentioned above is explained with reference to drawing 1 , drawing 3 , and drawing 4 .

[0034] Drawing 3 is a flow chart which shows operation of a transmitting output control in drawing 1 which it gets down and the error rate judging section 104 and the transmitting output-control section 107 perform, and drawing 4 is a flow chart which shows operation of transmitting output-control directions to the mobile radio terminal which the uphill error rate judging section 103 and the received field strength judging section 105 perform.

[0035] In the base transceiver station, it gets down, and it gets down to the error rate judging section 104 beforehand, and the upper limit threshold of the rate of a framing error is set to it. When [ which is sent out to a mobile radio terminal from a base transceiver station ] getting down and controlling the transmitting output of the electric wave of a direction, first, a base transceiver station extracts the rate of a framing error of the direction of going down which the mobile radio terminal reported from a mobile radio terminal measured, gets down from the value in the decoder section 102, and notifies to the error rate judging section 104 (Step 301). It gets down and comparison with a certain notified upper limit threshold of the rate of a going-down framing error beforehand set up at intervals of the period (for example, 2 seconds) is performed by getting down and accumulating the rate of a framing error of a direction in the error rate judging section 104 (Step 302). When exceeding a threshold as a result, a base transceiver station confirms whether to transmit with the maximum output now (Step 303). When the base transceiver station has transmitted with the maximum output, it gets down, and it judges that the rate of a framing error cannot improve more than it, that is gone up, and it notifies to the error rate judging section 103 (Step 304). After Step 301 - 304 ends, it gets down and the error rate judging section 104 sets up a transmitting output based on the detected rate of a going-down framing error it was notified by getting down and notifying the rate of a framing error to the transmitting output-control section 107 that the transmitting output-control section 107 was (Step 305). In a base transceiver station, an electric wave is transmitted with the transmitting output according to the set point which the transmitting output-control section 107 set up.

[0036] That is, a transmitting output is raised towards improving it, when the rate of a framing error is bad, and when the rate of a framing error is too good, a transmitting output is lowered in order to lessen



interference to other communications. Of course, when the transmitting output is the maximum, even if the rate of a framing error is bad, a transmitting output cannot be raised more than it.

[0037] Moreover, in order to perform the output control of the electric wave of the going-up direction from a mobile radio terminal, if an electric wave is received from a mobile radio terminal, a base transceiver station will measure the received field strength of a received electric wave in the digital recovery section 101, and will notify the result to the received field strength judging section 105 (Step 401). As for the signal digitized in the digital recovery section 101, error detection of received data is performed in the decoder section 102, and the error detection result goes up and is notified to the error rate judging section 103 (Step 402). There is the uphill error rate judging section 103, it carries out periodic (for example, 2 seconds) accumulation of the error detection result, and computes the rate of an uphill framing error after the period (Step 403) (Step 405). It is confirmed whether the uphill error rate judging section 103 has the notice with the state where the rate of a framing error which gets down and gets down from the error rate judging section 104 like the above-mentioned after computing the rate of an uphill framing error is not improvable (Step 406).

[0038] When there is no notice, the uphill error rate judging section 103 sets up target received field strength from the rate of an uphill framing error (Step 408). When a notice is received, the uphill error rate judging section 103 sets the target received field strength set up from the rate of an uphill framing error as the value which becomes lower than the usual value (Step 407). The uphill error rate judging section 103 notifies target received field strength to the received field strength judging section 105 after setting up target received field strength. In the received field strength judging section 105, comparison with the received field strength of the electric wave of the going-up direction notified from the digital recovery section 101 and the target received field strength notified from the uphill error rate judging section 103 is performed (Step 409), and when received field strength is smaller than target received field strength, it opts for increase directions of the transmitting output to a mobile radio terminal (Step 410). When received field strength is larger than target received field strength, it opts for reduction directions of the transmitting output to a mobile radio terminal (Step 411). The received field strength judging section 105 notifies the increase or reduction directions of a transmitting output to the mobile radio terminal determined by Step 410 or Step 411 to the selector section 106. In the selector section 106, increase in transmitting output / reduction directions to the notified mobile radio terminal are laid on top of transfer data, and it gets down, it outputs as a signal of a direction channel, and notifies to a mobile radio terminal.

[0039] In the above control, since target received field strength is set up lower than usual when it gets down and the rate of a framing error is not improved, increase/reduction directions of the transmitting output to the mobile radio terminal judged in the received field strength judging section 105 will work in the reduction direction. The transmitting output of a mobile radio terminal will decrease from usual as the result.

[0040] Moreover, in case target received field strength is set up, after setting up target received field strength previously, it may confirm that the rate of a framing error from which it gets down is not improved, and correction may be added to the value of target received field strength by the result.

[0041] Thus, in the gestalt of implementation of the first invention, if it judges that it is in the state where get down and degradation of the speech quality of a direction channel is not improved, raising the output of the electric wave of the uphill direction channel by force can perform control which does not give the interference to other telephone calls as much as possible, without carrying out.

[0042] Next, the gestalt of operation of the second of the transmitted power control unit concerning this invention is explained with reference to drawing 1, drawing 5, and drawing 6.

[0043] The composition of the equipment in a base transceiver station is the same as the gestalt of the first operation, and refer to drawing 1 for it. Drawing 5 and drawing 6 are flow charts which show operation of the gestalt of the second operation, and show operation concerning the output control of the electric wave which a base transceiver station transmits, and operation concerning the output control of the electric wave which the mobile radio terminal notified from a base transceiver station to a mobile radio terminal sends out, respectively.

[0044] First, the output control of the electric wave of the direction channel of going down which a base transceiver station sends out with reference to drawing 5 is explained.

[0045] In the base transceiver station, it gets down, and it gets down to the error rate judging section 104 beforehand, and the upper limit threshold of the rate of a framing error is set to it. When [ which is sent out to a mobile radio terminal from a base transceiver station ] getting down and controlling the transmitting output of the electric wave of a direction, first, a base transceiver station extracts the rate of a framing error of the direction of going down which the mobile radio terminal reported from a mobile radio terminal measured, gets down from the value in the decoder section 102, and notifies to the error rate judging section 104 (Step 501). It gets down and comparison with a certain notified upper limit threshold of the rate of a going-down framing error beforehand set up at intervals of the period (for example, 2 seconds) is performed by getting down and accumulating the rate of a framing error of a direction in the error rate judging section 104 (Step 502). When exceeding a threshold as a result, a base transceiver station confirms whether to transmit with the maximum output now (Step 503). When the base transceiver station has transmitted with the maximum output, it gets down, and it judges that the rate of a framing error cannot improve more than it, that is gone up, and it notifies to the error rate judging section 103 (Step 504). After Step 501 - 504 ends, it gets down and the error rate judging section 104 notifies the detected rate of a going-down framing error to the transmitting output-control section 107. In the transmitting output-control section 107, although it gets down and the transmitting output of a base transceiver station is set up based on the rate of a framing error, it is confirmed whether in that case, go up so that it may mention later that it cannot improve while [ in which the rate of an uphill framing error deteriorated ] it got down and had been notified from the error rate judging section 104, and it is notified from the error rate judging section 103 (Step 505). It gets down and the transmitting output-control section 107 sets up a transmitting output based on the rate of a framing error, when there is no notice (Step 507). When there is a notice, in case it gets down and the transmitting output-control section 107 sets up a transmitting output based on the rate of a framing error, it sets the set point as a low value from usual (Step 506).

[0046] And the electric wave from a base transceiver station is transmitted with the transmitting output according to the value set up in this way.

[0047] When it confirms that the rate of an uphill framing error is not improvable and the rate of an uphill framing error cannot be improved after the above control opts for a transmitting output previously, it may add correction so that it may transmit lower than usual.

[0048] Next, operation concerning control of the transmitting output directed to a mobile radio terminal with reference to drawing 6 is explained.

[0049] It goes up to the uphill error rate judging section 103 of a base transceiver station with the rate upper limit threshold of an uphill framing error beforehand, and the continuation degradation counter upper limit threshold is set to it. A base transceiver station performs error detection of an input signal in the decoder section 102 of the electric wave which was mentioned above and which was received from the mobile radio terminal like the gestalt of the first operation, and notifies to the uphill error rate judging section 103. In the uphill error rate judging section 103, the uphill rate of a framing error is computed after fixed period progress (for example, 2 seconds) (Steps 601-605).

[0050] The uphill error rate judging section 103 adds an uphill continuation degradation counter, when it exceeds a threshold as compared with the rate upper limit threshold of an uphill framing error which it had been computed and is beforehand set up in the rate of a framing error next (Step 606) (Step 607). When that is not right, an uphill continuation degradation counter is cleared (Step 608). Furthermore, it judges that the rate of a framing error of the uphill direction can deteriorate the uphill error rate judging section 103, and cannot improve it when an uphill continuation degradation counter value goes up the counter value as compared with the uphill continuation degradation counter upper limit threshold set up beforehand (Step 609) and it is over the continuation degradation counter upper limit threshold after the uphill continuation degradation counter setup, and that notifies to the transmitting output-control section 107 (Step 610).

[0051] Then, it is confirmed whether the uphill error rate judging section 103 has the notice with the

state where the rate of a framing error which gets down and gets down from the error rate judging section 104 like the above-mentioned is not improvable (Step 611).

[0052] When there is no notice, the uphill error rate judging section 103 sets up target received field strength from the rate of an uphill framing error (Step 613). When a notice is received, the uphill error rate judging section 103 sets the target received field strength set up from the rate of an uphill framing error as the value which becomes lower than the usual value (Step 612). The uphill error rate judging section 103 notifies target received field strength to the received field strength judging section 105 after setting up target received field strength. In the received field strength judging section 105, comparison with the received field strength of the electric wave of the going-up direction notified from the digital recovery section 101 and the target received field strength notified from the uphill error rate judging section 103 is performed (Step 614), and when received field strength is smaller than target received field strength, it opts for increase directions of the transmitting output to a mobile radio terminal (Step 615). When received field strength is larger than target received field strength, it opts for reduction directions of the transmitting output to a mobile radio terminal (Step 611). The received field strength judging section 105 notifies the increase or reduction directions of a transmitting output to the mobile radio terminal determined by Step 615 or Step 616 to the selector section 106. In the selector section 106, increase in transmitting output / reduction directions to the notified mobile radio terminal are laid on top of transfer data, and it gets down, it outputs as a signal of a direction channel, and notifies to a mobile radio terminal.

[0053] In the above control, since target received field strength is set up lower than usual when it gets down and the rate of a framing error is not improved, increase/reduction directions of the transmitting output to the mobile radio terminal judged in the received field strength judging section 105 will work in the reduction direction. The transmitting output of a mobile radio terminal will decrease from usual as the result.

[0054] Thus, in the gestalt of implementation of the second invention, it judges, respectively that get down with the uphill direction and degradation of the speech quality of each channel of a direction is not improved, and when degradation of the speech quality of the channel of other directions is not improved, raising the output of the electric wave of the channel of the self-direction by force can perform control which does not give the interference to other communications as much as possible, without carrying out.

[0055] Then, the gestalt of operation of the third of the transmitted power control unit concerning this invention is explained with reference to drawing 1, drawing 7, and drawing 8.

[0056] The composition of the equipment in a base transceiver station is the same as the gestalt of the first operation, and refer to drawing 1 for it. Drawing 7 and drawing 8 are flow charts which show operation of the gestalt of the third operation, and show operation concerning the output control of the electric wave which a base transceiver station transmits, and operation concerning the output control of the electric wave which the mobile radio terminal notified from a base transceiver station to a mobile radio terminal sends out, respectively.

[0057] First, the output control of the electric wave of the direction channel of going down which a base transceiver station sends out with reference to drawing 7 is explained.

[0058] A base transceiver station gets down and the rate upper limit threshold of the going-down framing error which gets down and is beforehand set up with the rate of a framing error of a direction which extracted the error rate judging section 104 in the decoder section 102 like the transmitting output control explained with the gestalt of the first operation, and was notified is compared (Step 701,702). And when it gets down, the rate of a framing error of a direction gets down and it exceeds the rate upper limit threshold of a framing error, a base transceiver station confirms whether transmit with the maximum output now (Step 703). When the base transceiver station has transmitted with the maximum output, it gets down, and judges that the rate of a framing error is not improvable, that is gone up, and it notifies to the error rate judging section 103 (Step 704). And if it cannot improve to the transmitting output-control section 107, with the rate of an uphill framing error deteriorated, that there is a notice will notify whether it is nothing that it does not change, but it gets down and the set point of a transmitting

output is set as a low value from usual based on the rate of a framing error. The transmitting output-control section 107 sets the set point of a transmitting output as a low value from usual with the directions, gets down from a base transceiver station (Step 705), and outputs the electric wave of a direction channel.

[0059] On the other hand, when the base transceiver station has not transmitted with the maximum output now, it gets down with that and the rate of a framing error is notified to the transmitting output-control section 107. In the transmitting output-control section 107, although it gets down and the transmitting output of a base transceiver station is set up based on the rate of a framing error, it is confirmed whether in that case, go up so that it may mention later that it cannot improve while [ in which the rate of an uphill framing error deteriorated ] it got down and had been notified from the error rate judging section 104, and it is notified from the error rate judging section 103 (Step 706). It gets down and the transmitting output-control section 107 sets up a transmitting output based on the rate of a framing error, when there is no notice (Step 708). When there is a notice, in case it gets down and a transmitting output is set up based on the rate of a framing error, the set point is set as a low value from usual (Step 707).

[0060] Next, operation concerning control of the transmitting output directed to a mobile radio terminal with reference to drawing. 8 is explained.

[0061] The uphill error rate judging section 103 of a base transceiver station Like the transmitting output control of the mobile radio terminal in the base transceiver station which explained with the gestalt of the second operation In order to confirm whether it can improve while it goes up with the rate upper limit threshold of an uphill framing error, the continuation degradation counter upper limit threshold is set up beforehand and the rate of a framing error of the uphill direction had deteriorated Compute the rate of an uphill framing error after a certain periodic (for example, 2 seconds) progress, and comparison with the rate upper limit threshold of an uphill framing error is performed. A continuation degradation counter is set up (Steps 801-808), and comparison of a continuation degradation counter and a continuation degradation counter upper limit threshold is performed (Step 809). If it cannot improve while it judged that the uphill error rate judging section 103 could not improve the rate of a framing error of the uphill direction when a continuation degradation counter exceeds a continuation degradation counter upper limit threshold, it notified and (Step 810) got down from that to the transmitting output-control section 107 and the rate of a framing error had deteriorated, it will not change, but that there is a notice will set [ whether it is nothing and ] up so that it may become lower than usual about target received field strength (Step 811).

[0062] Then, it is confirmed whether the uphill error rate judging section 103 has the notice with the state where the rate of a framing error which gets down and gets down from the error rate judging section 104 like the above-mentioned is not improvable (Step 812).

[0063] When there is no notice, the uphill error rate judging section 103 sets up target received field strength from the rate of an uphill framing error (Step 814). When a notice is received, the uphill error rate judging section 103 sets the target received field strength set up from the rate of an uphill framing error as the value which becomes lower than the usual value (Step 813). The uphill error rate judging section 103 notifies target received field strength to the received field strength judging section 105 after setting up target received field strength. In the received field strength judging section 105, comparison with the received field strength of the electric wave of the going-up direction notified from the digital recovery section 101 and the target received field strength notified from the uphill error rate judging section 103 is performed (Step 815), and when received field strength is smaller than target received field strength, it opts for increase directions of the transmitting output to a mobile radio terminal (Step 816). When received field strength is larger than target received field strength, it opts for reduction directions of the transmitting output to a mobile radio terminal (Step 817). The received field strength judging section 105 notifies the increase or reduction directions of a transmitting output to the mobile radio terminal determined by Step 816 or Step 817 to the selector section 106. In the selector section 106, increase in transmitting output / reduction directions to the notified mobile radio terminal are laid on top of transfer data, and it gets down and notifies to a mobile radio terminal as a signal of a direction

channel.

[0064] Thus, in the gestalt of implementation of the third invention, when it judges, respectively that get down with the uphill direction and degradation of the speech quality of each channel of a direction is not improved and judges with degradation of the speech quality of the channel of the self-direction not being improved, regardless of the degradation situation of the speech quality of the channel of the other directions, the output of the electric wave of the channel of the self-direction can be lowered, and control which does not give the interference to other telephone calls as much as possible can be performed.

[0065] Furthermore, the gestalt of operation of the fourth of the transmitted power control unit concerning this invention is explained with reference to drawing 9.

[0066] Drawing 9 is the block diagram showing the composition of the transmitted power control unit in a base transceiver station, and it has the same function in this drawing except for the digital recovery section 901, the decoder section 902, the uphill error rate judging section 903, each functional block of composition of that the error rate judging section 904, the received field strength test section 905, the selector section 906, the transmitting output-control section 907, and the amplification controller 909 were shown in drawing 1 by getting down, and the point mentioned later.

[0067] In the composition of the gestalt of this operation, it has the traverse-speed test section 908, and this traverse-speed test section 908 measures time transition of the received field strength which receives from a mobile radio terminal, extracts the speed feature factor, presumes the speed of a mobile radio terminal, usually classifies the mobile radio terminal under communication into the two move modes of the move mode with the high-speed move mode, and has the function which outputs the information.

[0068] The rate upper limit threshold for the move modes of an uphill framing error and the uphill continuation degradation counter upper limit threshold for the usual move modes, and the rate upper limit threshold for the high-speed move modes of an uphill framing error and the uphill continuation degradation counter upper limit threshold for the high-speed move modes are usually beforehand set to the uphill error rate judging section 903 of a base transceiver station. Moreover, it gets down and the rate upper limit threshold for the move modes of a going-down framing error and the rate upper limit threshold for the high-speed move modes of a going-down framing error are usually beforehand set to the error rate judging section 904.

[0069] This is the disposal in consideration of the case where they are the uphill direction channel or the thing which it gets down and degradation of the speech quality of a direction channel depends on local influence. Since it is thought that time to probably exist in the area will probably be temporary when the mobile radio terminal is carrying out high-speed movement, even if degradation of a speech quality is detected there, possibility of passing through the area immediately and returning to the quality of a basis again will be high. It is not desirable to judge such a thing as degradation of a speech quality uniformly, and to degrade the channel quality of other directions.

[0070] Then, even if it is usually the method of having so far explained control action to the mobile radio terminal of the high-speed move mode performing transmitted power control by the method explained so far by the move mode in speed, the threshold for judging with quality degradation is set up more highly, and even when judged with quality degradation, by the high-speed move mode, a measure is usually taken at the move mode so that it may not be judged with quality degradation.

[0071] Moreover, the threshold may make both of the modes the same, and the method of changing the calculation period of an error rate is sufficient as it. Though the calculation period of an error rate is lengthened and there is aggravation of an actual error rate, it can also prevent from being immediately judged with degradation of a speech quality in the case of the high-speed move mode.

[0072] Thus, the judgment means of the move mode and two kinds of high-speed move modes is usually prepared in the uphill error rate judging section 903 and the going-down error rate judging section 904, respectively.

[0073] During communication with a mobile radio terminal, the mobile radio terminal is discriminating whether it is the high-speed move mode and whether it is usually the move mode, and goes up the information in the traverse-speed judging section 908, and a base transceiver station notifies to the error rate judging section 903 and the going-down error rate judging section 904. When the move mode of a

mobile radio terminal usually shifts to the move mode from high-speed move MODOHE from the move mode, or the high-speed move mode, the traverse-speed judging section 908 goes up the move mode change information on a mobile radio terminal, and notifies it to the error rate judging section 903 and the going-down error rate judging section 904, respectively. The uphill error rate judging section 903 and the speech quality judging corresponding to each move mode if the error rate judging section 904 receives the notice of the move mode of a mobile radio terminal from the traverse-speed judging section 908 by getting down are performed, and transmitted power control is performed according to it.

[0074] Drawing 10 is the block diagram showing the gestalt of operation of the fifth of this invention, and has the composition that the subscriber class judging section 1009 was added to the composition of drawing 9.

[0075] In this drawing, it has the same function except for the digital recovery section 1001, the decoder section 1002, the uphill error rate judging section 1003, functional each block of composition of that the error rate judging section 1004, the received field strength test section 1005, the selector section 1006, the transmitting output-control section 1007, and the amplification controller 1010 were shown in drawing 9 by getting down, and the point mentioned later. The subscriber class judging section 1009 classifies the subscriber class of the mobile radio terminal under present communication into a priority subscriber class and an ordinary subscriber class according to a subscriber's number, and has the function which outputs the information.

[0076] The rate upper limit threshold for priority subscribers of an uphill framing error, the rate upper limit threshold for priority subscribers of an uphill framing error, and the uphill continuation degradation counter upper limit threshold for priority subscribers are beforehand set to the uphill error rate judging section 1003 of a base transceiver station. Moreover, it gets down and the rate upper limit threshold for priority subscribers of a going-down framing error is beforehand set to the error rate judging section 1004.

[0077] This is the disposal which took into consideration change by the subscriber class of a mobile radio terminal to the criterion which degrades other good channel quality the uphill direction channel or when it gets down and there is degradation of the speech quality of a direction channel. When priority attachment is done by the ordinary subscriber with public responsibility for which a mobile radio terminal is used in the public government office of the police, fire fighting, or others, it may not be desirable to make the same as that of an ordinary subscriber the criterion which it judges [ criterion ] as degradation of a speech quality and degrades the channel quality of other directions.

[0078] Then, an ordinary subscriber receives the mobile radio terminal to which the subscriber class with a high priority was given noting that he performs transmitted power control by the method explained so far. Even if control action is a method explained so far, it sets up the threshold for judging with quality degradation more highly, and at an ordinary subscriber's mobile radio terminal, even when judged with quality degradation, it deals with it with a mobile radio terminal with a high priority, so that it may not be judged with quality degradation.

[0079] Moreover, both thresholds may be made the same and the method of changing the calculation period of an error rate is sufficient as them. Though the calculation period of an error rate is lengthened and there is aggravation of an actual error rate, it can also prevent from being immediately judged with degradation of a speech quality in the case of a subscriber class with a high priority.

[0080] Thus, two kinds of judgment meanses, the object for ordinary subscribers and the object for priority subscribers, are prepared in the uphill error rate judging section 1003 and the going-down error rate judging section 1004, respectively.

[0081] In case a mobile radio terminal communicates with a base transceiver station, from the data received in the decoder section 1002, the subscriber's number of a mobile radio terminal is acquired, the subscriber class judging section 1009 judges whether you are a priority subscriber and whether a mobile radio terminal is an ordinary subscriber from the subscriber's number, and in the case of a priority subscriber, that is gone up, and it notifies it to the error rate judging section 1003 and the going-down error rate judging section 1004. The uphill error rate judging section 1003 and the speech quality judging corresponding to each subscriber class if the error rate judging section 1004 receives the notice

of the subscriber class of the mobile radio terminal under communication from the subscriber class judging section 1009 by getting down are performed, and transmitted power control is performed according to it.

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[Translation done.]

**\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DESCRIPTION OF DRAWINGS

### [Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the composition of the gestalt of 1 operation of the transmitted power control unit of this invention.

[Drawing 2] It is the system concept view showing the construct in the radio area of the base transceiver station and mobile radio terminal in this invention.

[Drawing 3] It is the flow chart which shows operation of a transmitting output control in drawing 1 which it gets down and the error rate judging section and the transmitting output-control section perform.

[Drawing 4] It is the flow chart which shows operation of transmitting output-control directions to the mobile radio terminal which the uphill error rate judging section and the received field strength judging section in drawing 1 perform.

[Drawing 5] It is the flow chart which shows operation of the transmitting output control in the gestalt of the second operation in drawing 1 which it gets down and the error rate judging section and the transmitting output-control section perform.

[Drawing 6] It is the flow chart which shows operation of transmitting output-control directions to the mobile radio terminal in the gestalt of the second operation which the uphill error rate judging section and the received field strength judging section in drawing 1 perform.

[Drawing 7] It is the flow chart which shows operation of the transmitting output control in the gestalt of the third operation in drawing 1 which it gets down and the error rate judging section and the transmitting output-control section perform.

[Drawing 8] It is the flow chart which shows operation of transmitting output-control directions to the mobile radio terminal in the gestalt of the third operation which the uphill error rate judging section and the received field strength judging section in drawing 1 perform.

[Drawing 9] It is the block diagram showing the composition of the fourth of the gestalt of operation of the transmitted power control unit of this invention.

[Drawing 10] It is the block diagram showing the composition of the fifth of the gestalt of operation of the transmitted power control unit of this invention.

[Drawing 11] It is the block diagram showing the composition of the transmitted power control unit in a Prior art.

[Drawing 12] It is the flow chart which shows operation of transmitting output-control directions to the mobile radio terminal in a Prior art.

[Drawing 13] It is the flow chart which shows operation of the transmitting output control of a base transceiver station in a Prior art.

### [Description of Notations]

101, 901, 1001, 1101 Digital recovery section

102, 902, 1002, 1102 Decoder section

103, 903, 1003, 1103 Uphill error rate judging section

104, 904, 1004 It gets down and is the error rate judging section.



105, 905, 1005, 1104 Received field strength judging section  
106, 906, 1006, 1105 Selector section  
107, 907, 1007, 1106 Transmitting output-control section  
108, 909, 1010, 1107 Amplification controller  
908 1008 Traverse-speed judging section  
1009 Subscriber Class Judging Section

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[Translation done.]

\* NOTICES \*

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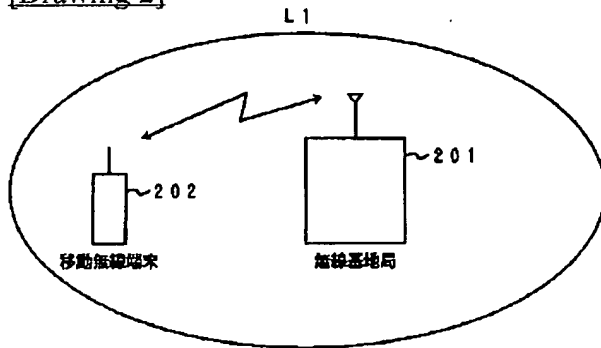
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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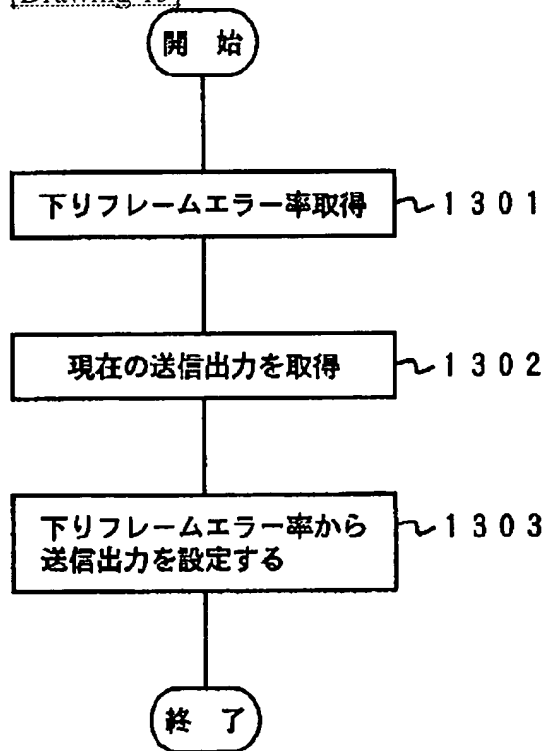
DRAWINGS

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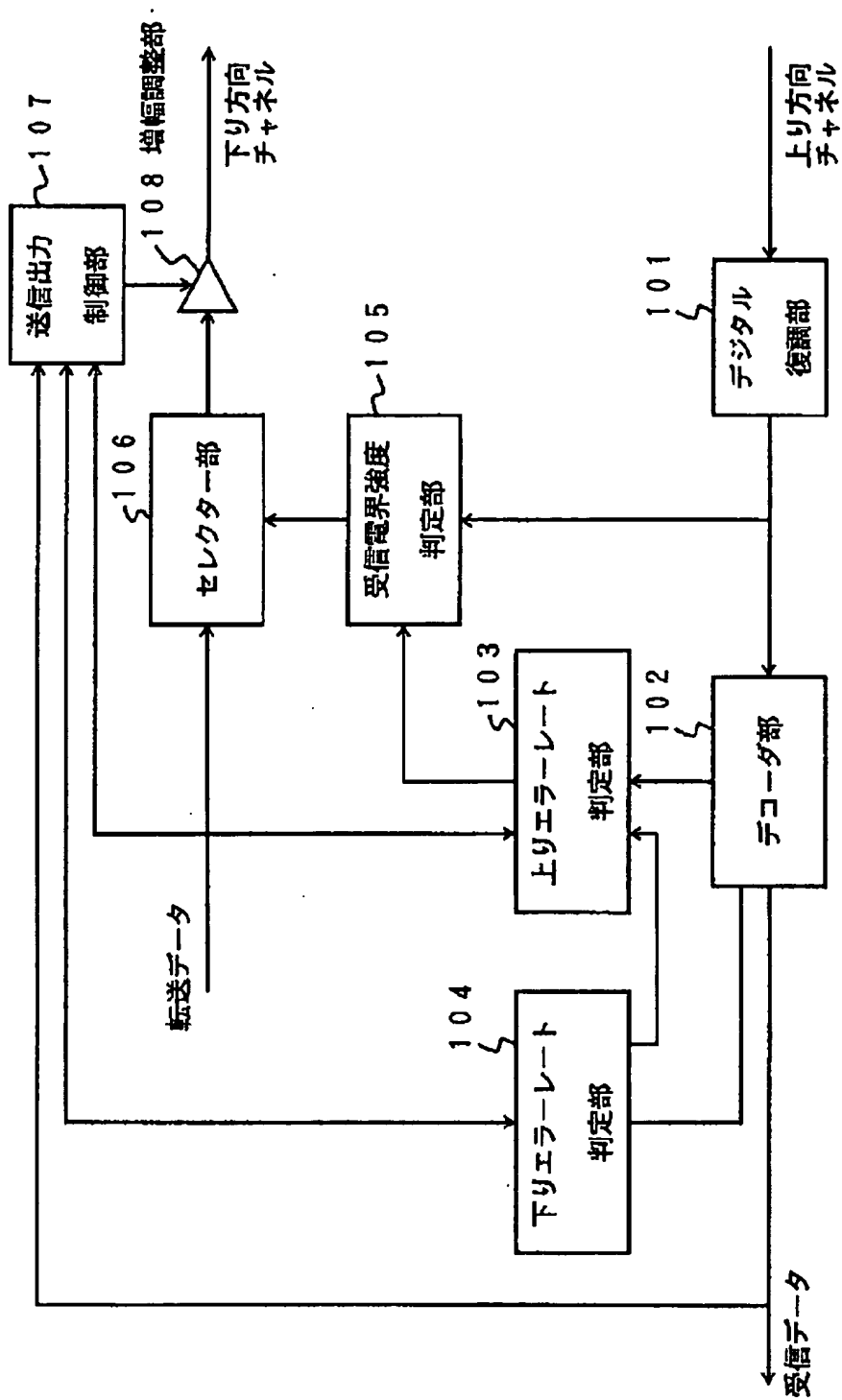
[Drawing 2]



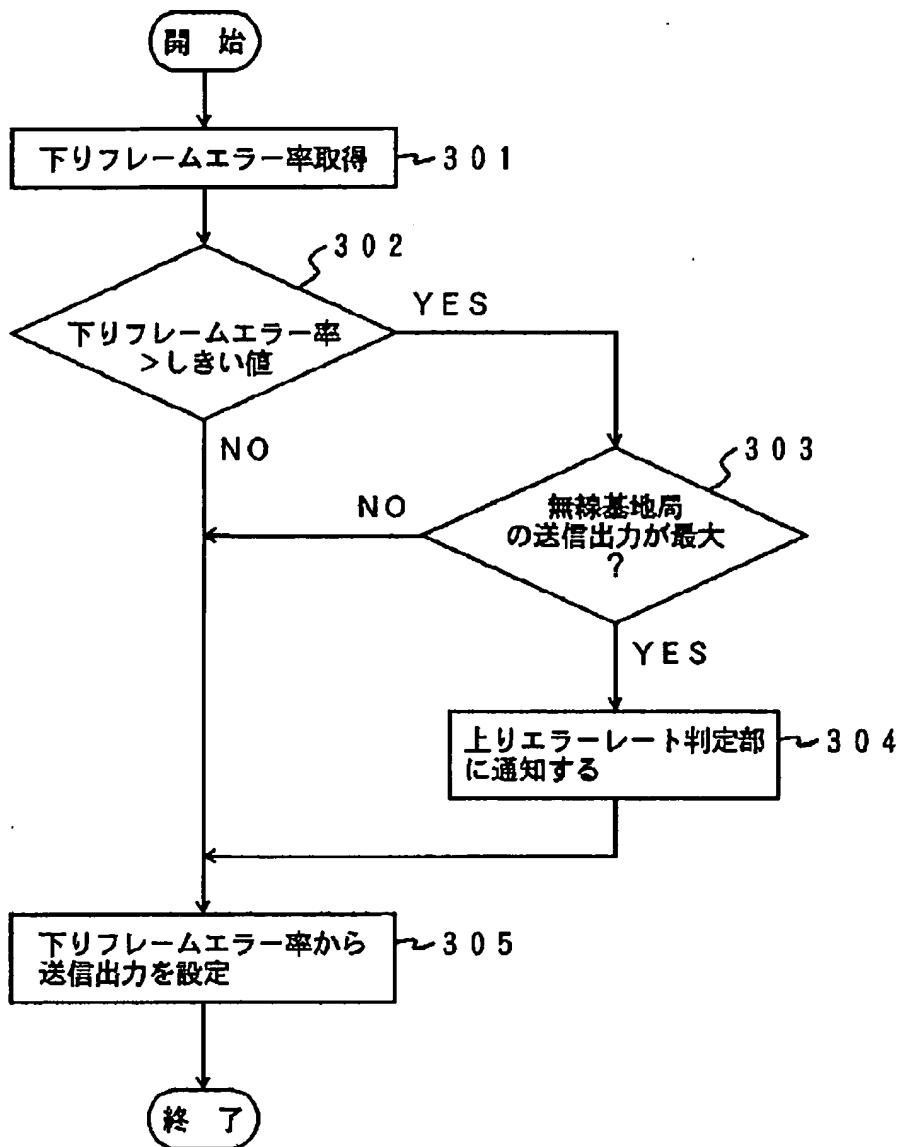
[Drawing 13]



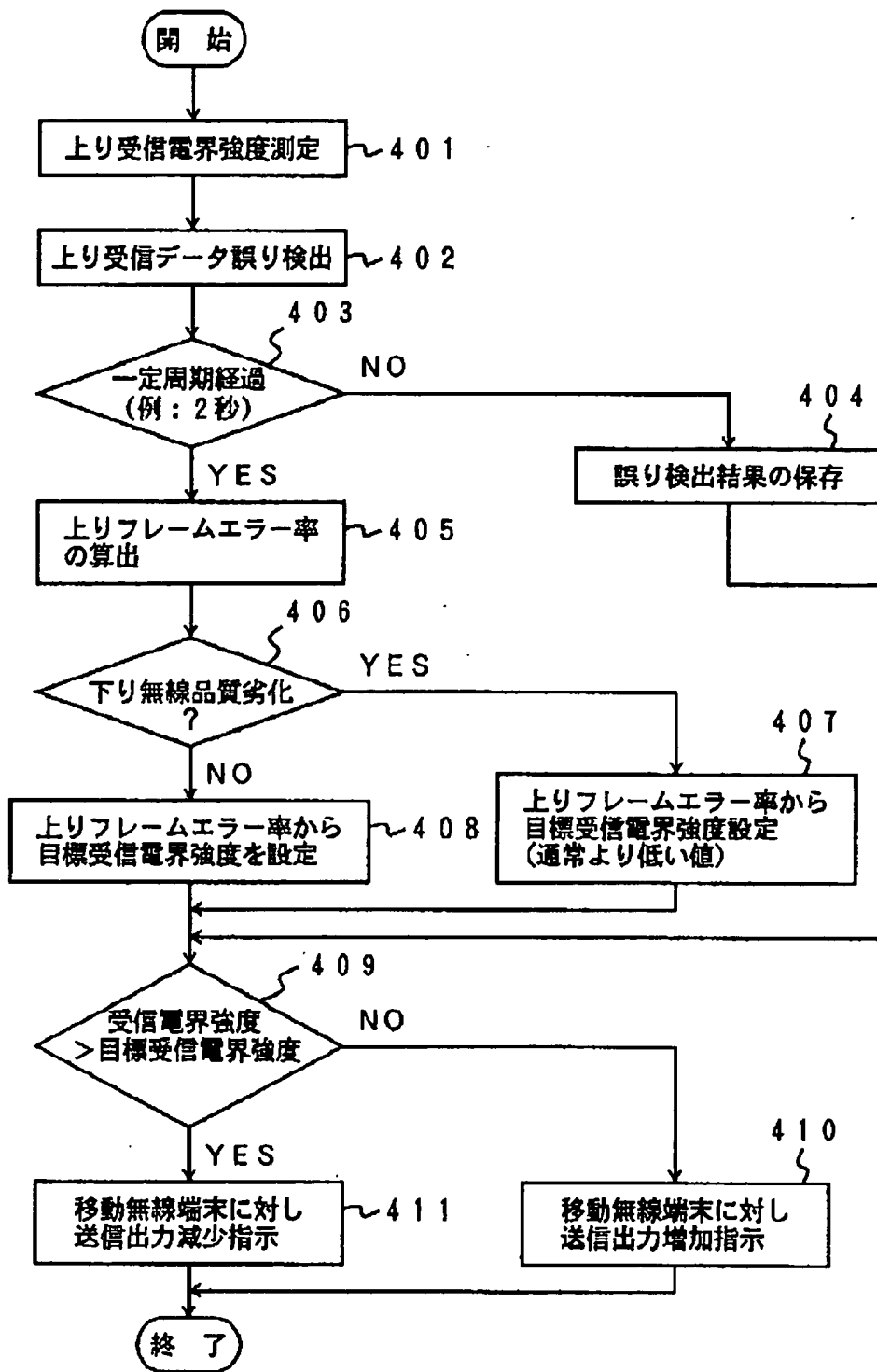
[Drawing 1]



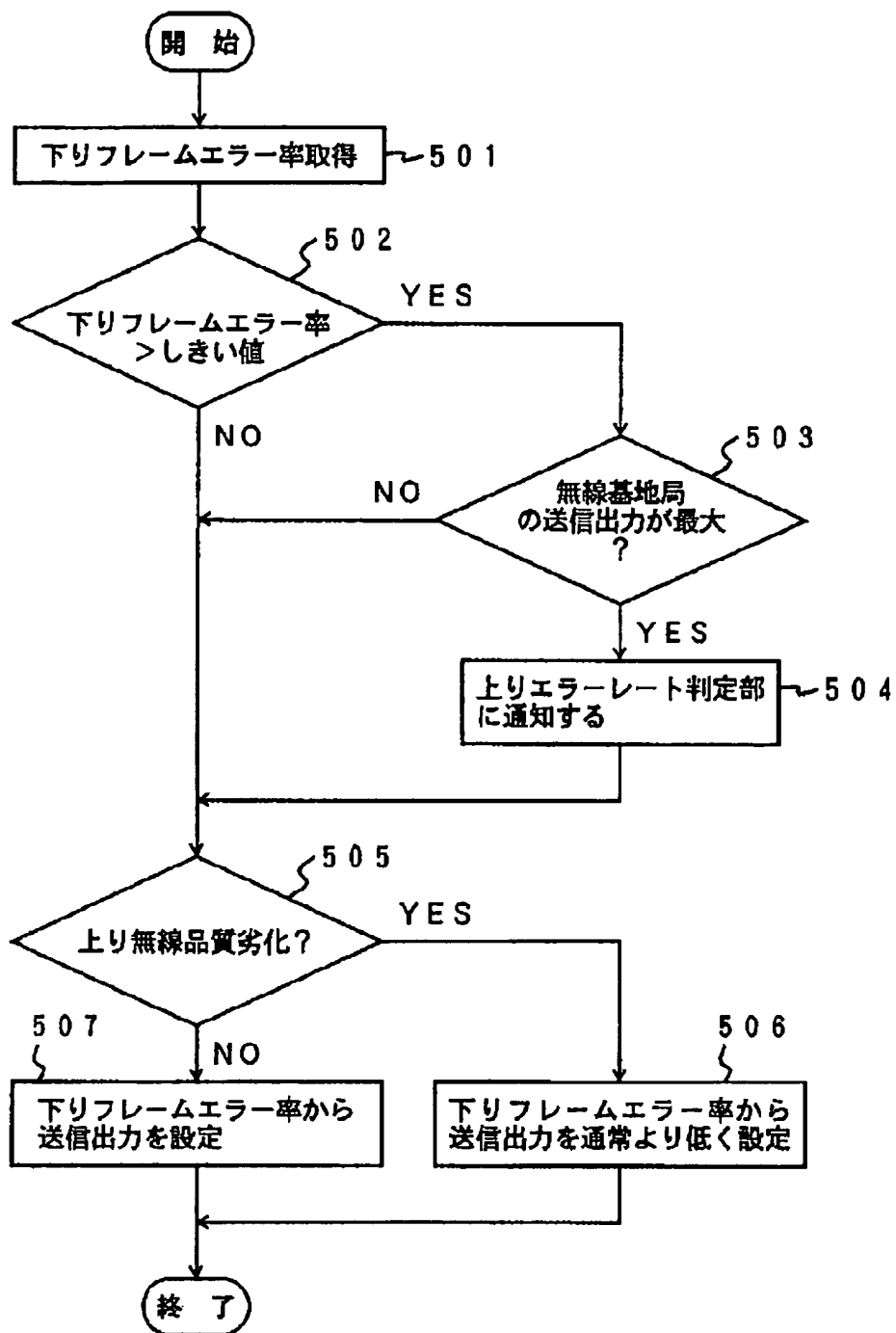
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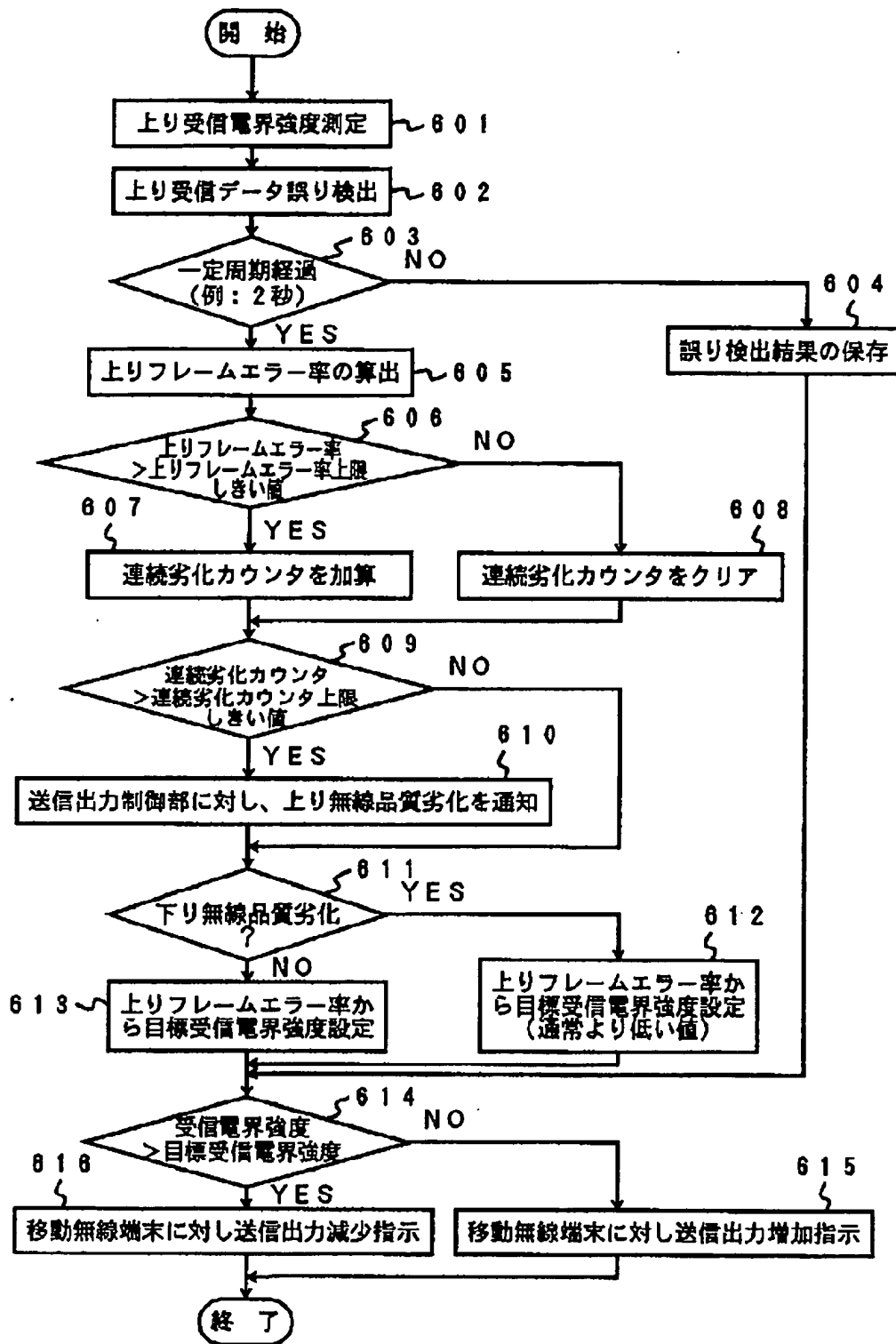
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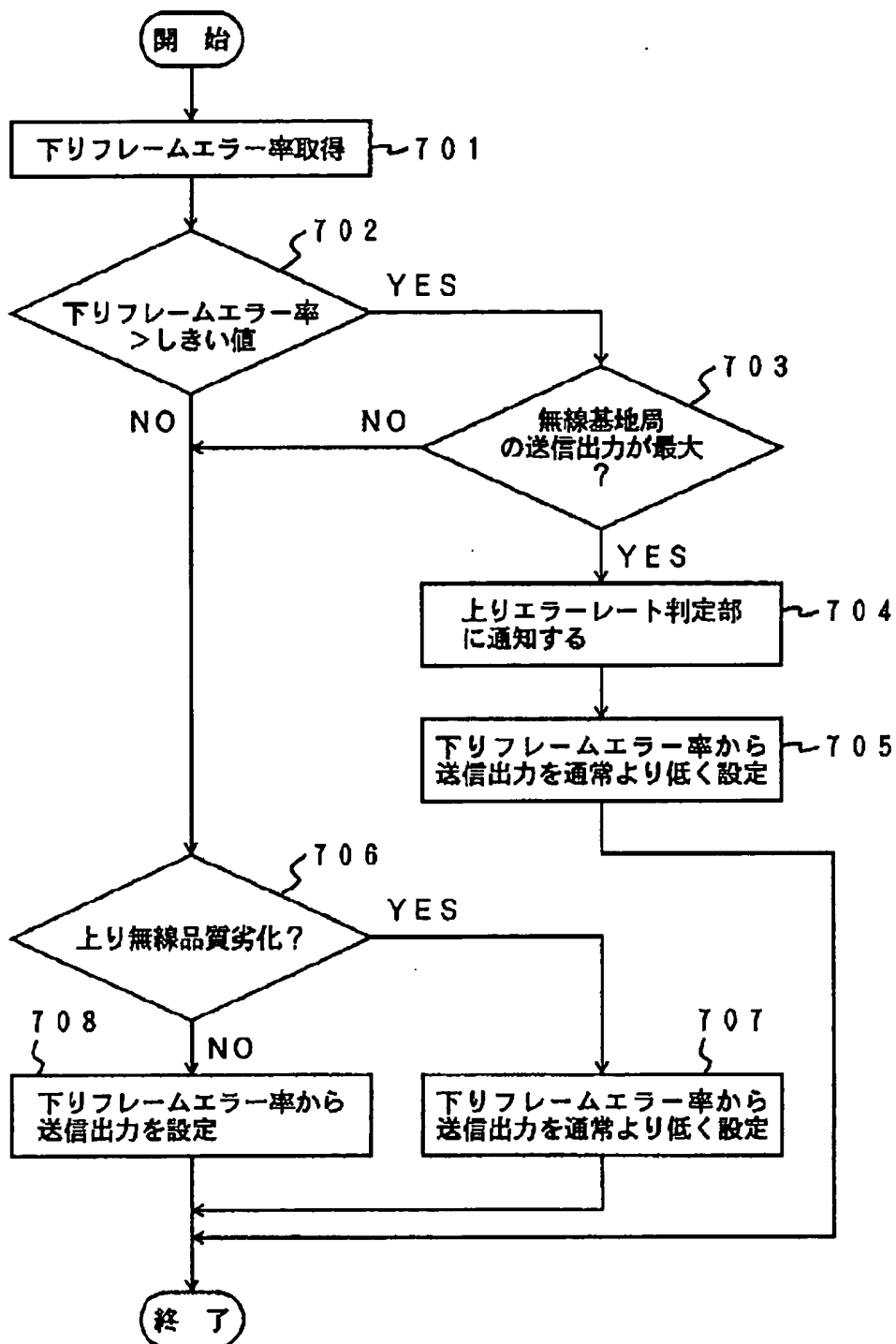
[Drawing 5]



[Drawing 6]

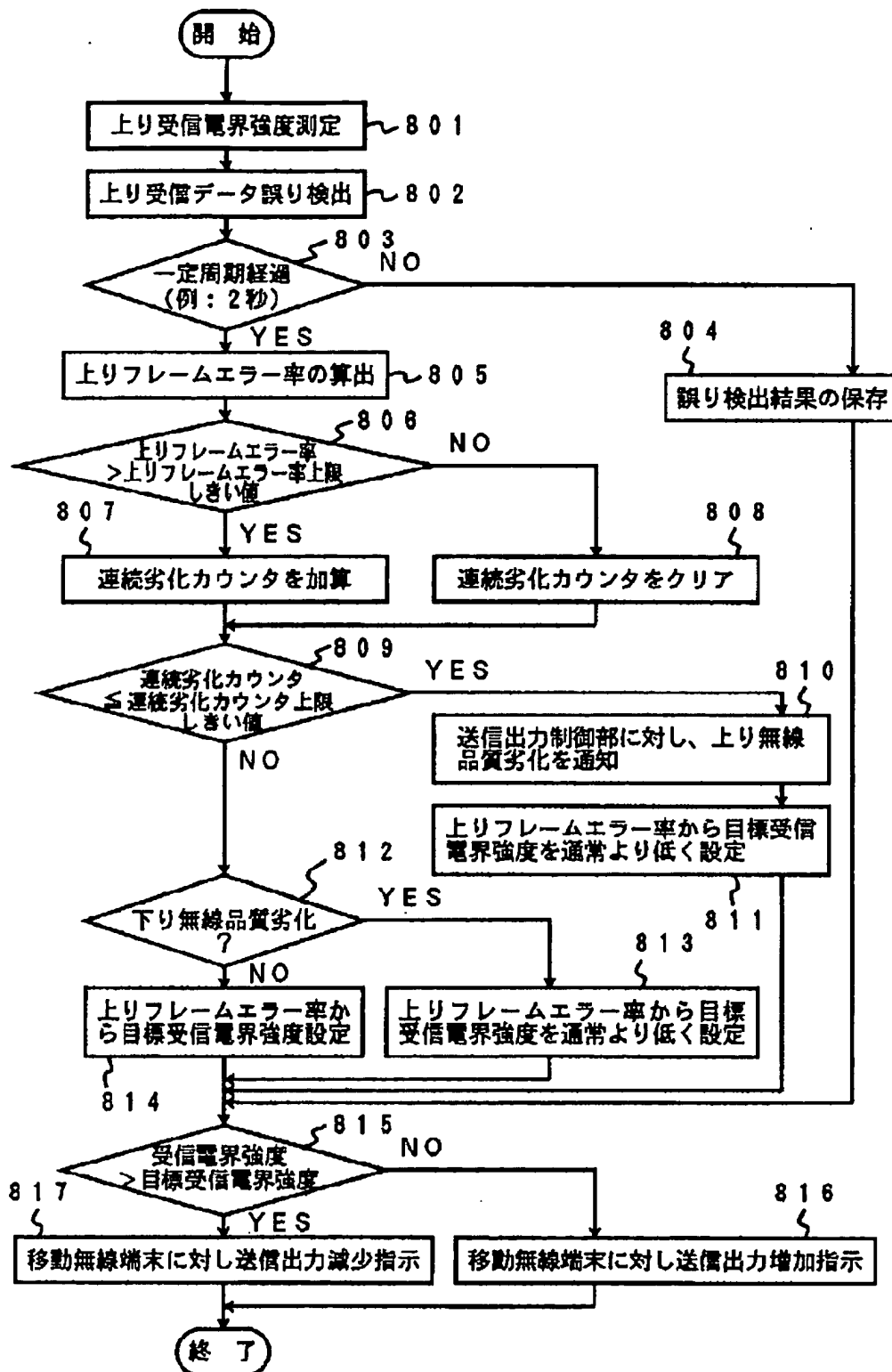


[Drawing 7]

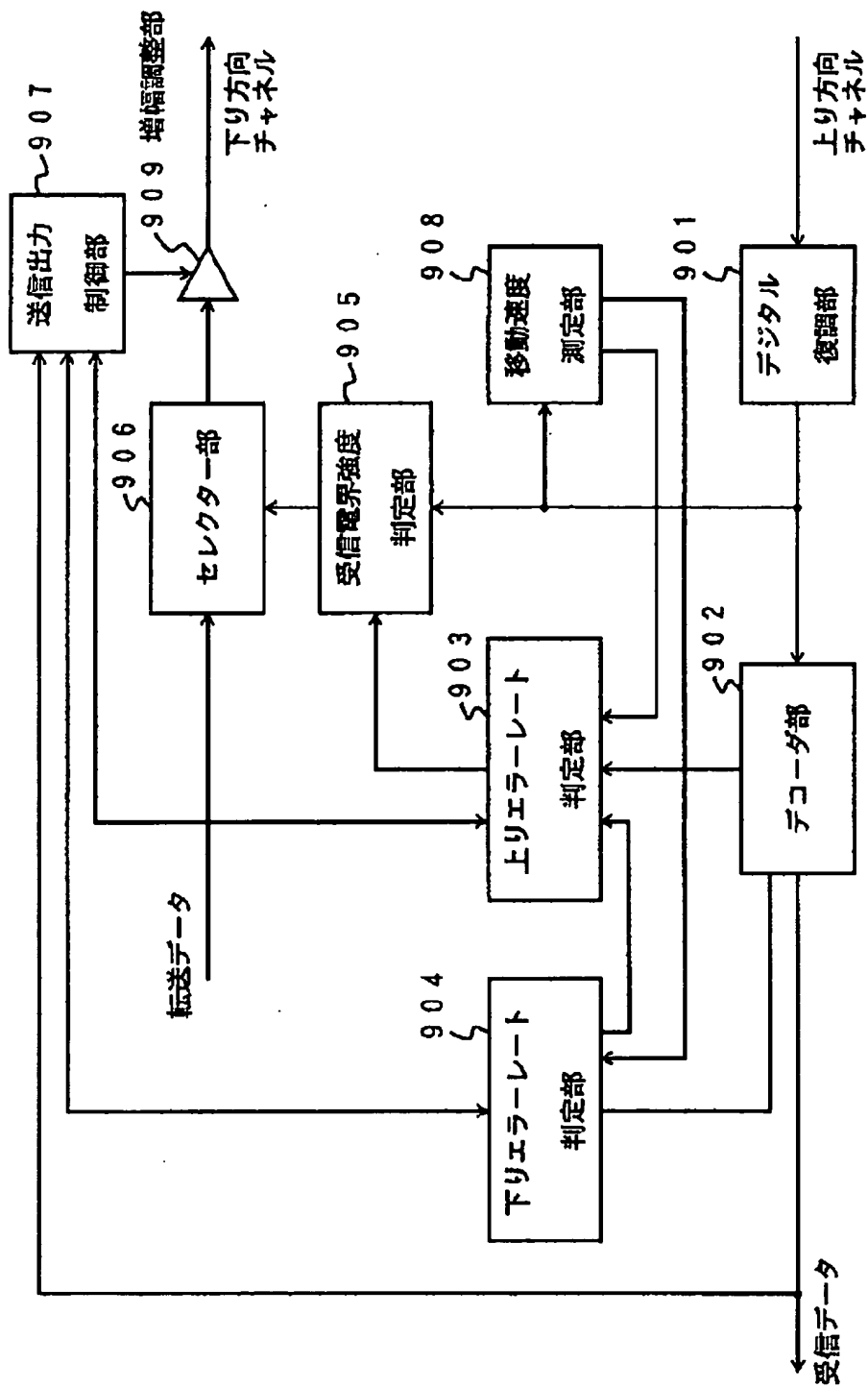


[Drawing 8]

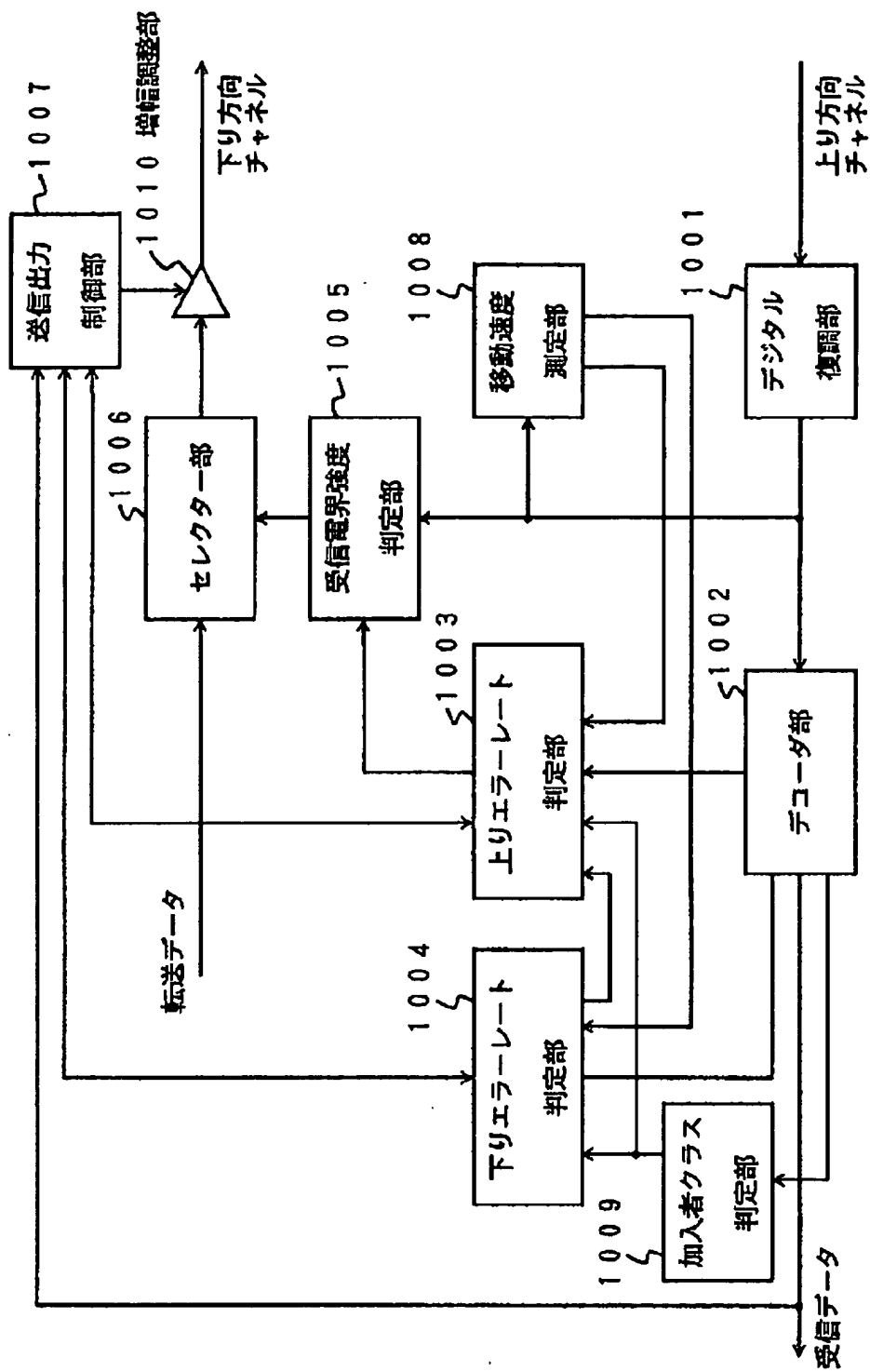




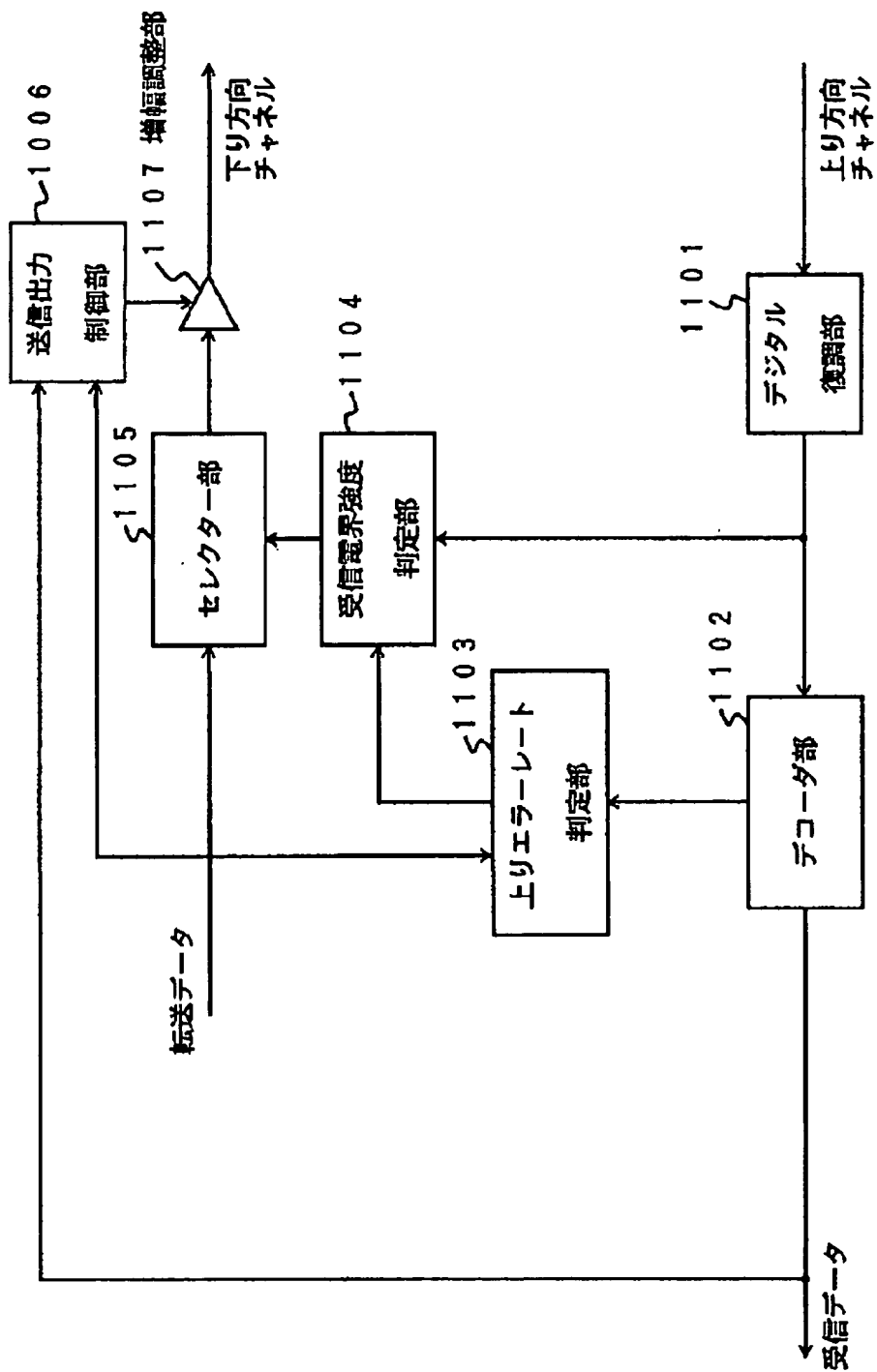
[Drawing 9]



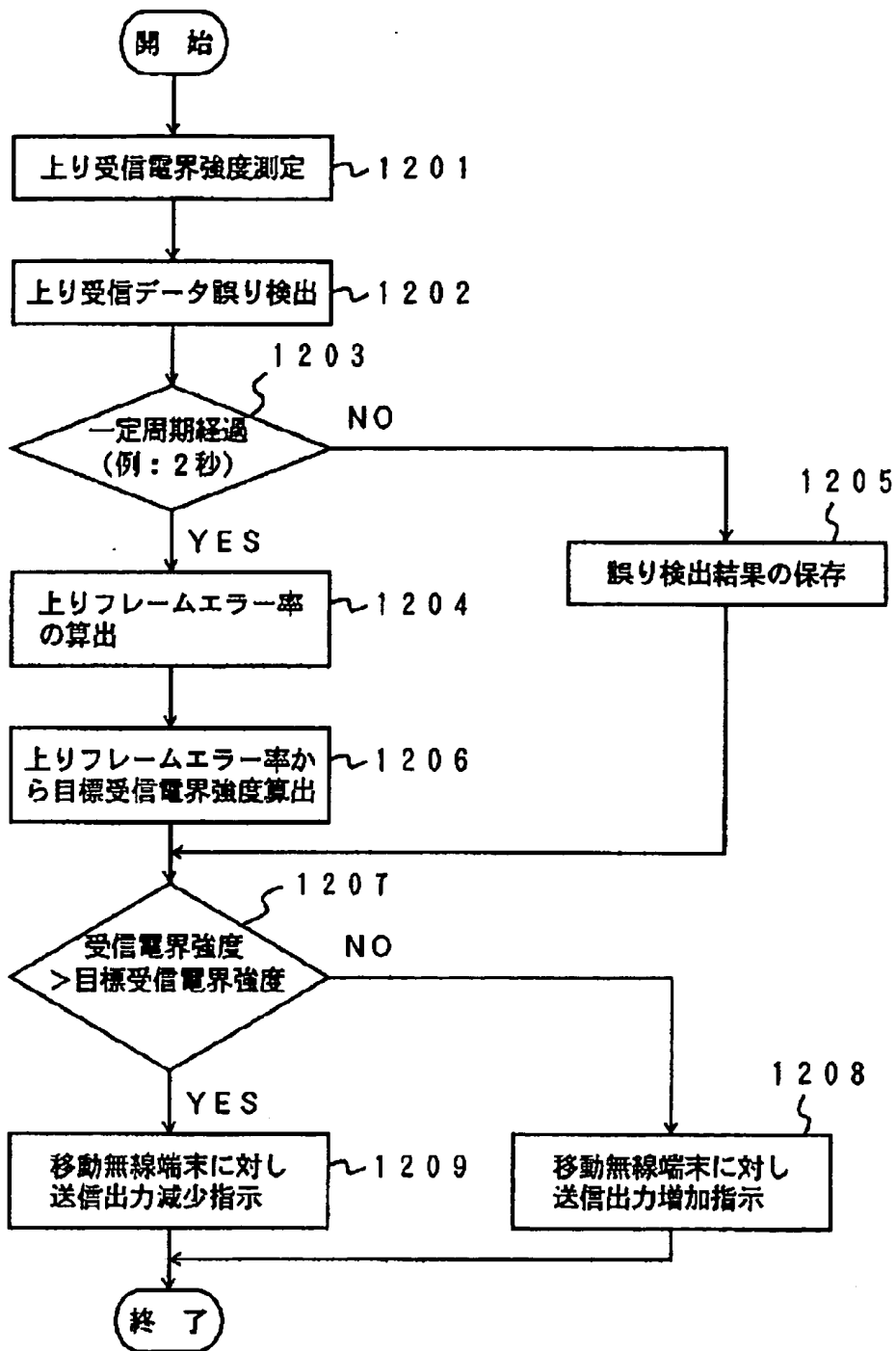
[Drawing 10]



[Drawing 11]



[Drawing 12]



[Translation done.]